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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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British Trade Expansion

GREAT Britain is by no means the only nation which is at present anxious to develop home manufactures and to find increased markets for them overseas. The United States, which not so long since accepted without question the doctrine of American self-dependence, is now seeking outlets for surplus products, partly because it recognises the importance of international trade and partly because it desires to employ American ships in carrying American goods instead of in distributing those of other nations. Germany's attention to export trade has become proverbial. Japan is more and more seeking a place among the recognised exporting nations. Russia is making pathetic efforts to revive the international exchange of goods which its Soviet emancipators have succeeded in killing. And many more examples might be quoted. Among them all Great Britain holds as good a position as the best. If we have not yet developed mass production, with its consequent reduced costs and lower selling prices, our products have a reputation for quality which certainly no nation excels and but few have equalled, and our manufacturers have a name for honesty securely based on long experience. The thoroughness with which we have discharged our obligations during the last few years has impressed all nations with the stability of our position and our apparently endless resources. The restoration of our credit almost, if not quite, to where it stood before the war has no parallel that we can recall.

On all these grounds our commercial prospects as a nation look favourable. We start with a good reputation, the value of which every traveller and salesman knows. What are the conditions necessary in order to turn this favourable situation to practical account? First in importance everyone would probably place the condition of a real peace between nations, with the international confidence which would follow. We have not yet reached that stage, but, in spite of the temporary trouble between France and Germany, are laboriously moving towards it. Meanwhile, time is not being wholly wasted. When the trade tide really begins to flow Britain will be as well prepared as most competitors to take advantage of it. Our main asset will remain our reputation for quality. On the chemical side, especially in fine products to which people formerly looked to Germany as a matter of course, our position is better than ever, while that of most competitors is worse. The progress in the production of dyestuffs has been so fully noticed of late that little need now be added. It is sufficient to repeat that 80 per cent. of our needs are being satisfactorily supplied, and the remaining margin, still in the hands of Germany and Switzerland, is being gradually penetrated. In chemical plant we hold our own well, and the desire for improvement is a guarantee that our position will not become weaker. As producers in the chemical field British manufacturers are stronger to-day than they have ever been before. On every side, again, the work of research is receiving increased attention. The standard of technical education is rising, and our young chemists and technologists are bringing new thought and invention to bear on our problems.

In all this there is much to encourage confidence and enterprise. Perhaps what is needed most is better organisation for making the quality of British products more widely known and a more liberal use of the arts of salesmanship. These, too, are receiving increased attention and study. When to our merits as producers of honest stuff we add the qualities of good advertisers and good salesmen there will be justification for the view that the British chemical industry has a great future. We have spoken chiefly from the production point of view, because the theory that Britain must remain rather a nation of distributors than of producers has little foundation. What has been done on the production side in the last few years supplies sufficient evidence on the point. But there is room also for the merchant—not the glorified marine-store dealer, whose dealings are "in the street," but the genuine merchant who distributes our products to a constituency many a producer could not directly reach. There is room for more co-operation between producer and distributor in the development of British

trade and for a better understanding as the province and functions of each are better understood by the other. The trade announcements in this issue will carry a knowledge of the range of British chemical manufactures into many overseas markets. And in due course, as the result of all these collective efforts, the reward will come as surely as the night follows the day.

Outstanding Work on Oxygen

We have heard it remarked that the pages dealing with current patents are one of the most instructive features of a technical journal. This contention must not, of course, be accepted too literally; but there can be no question that intelligent consideration of what others are doing proves of enormous assistance in keeping one abreast of the times; and frequently the tale unfolded by a formal and stereotyped list of specifications carries some special significance which may entirely change our outlook on the everyday operations for which we are responsible. The majority of us, perhaps, usually fail to appreciate in the early stages the significance of some particular invention, and probably few, for example, have stopped to ponder over the details of a specification which appeared in our "Patent Literature" a fortnight ago, or to consider what may be at the back of the mind of the inventors.

We refer to a process which has been protected by the firm over which Sir Arthur Duckham presides, and which relates to the separation of oxygen from atmospheric air. As a matter of fact, it has been within our knowledge that Sir Arthur has for some time been deeply interested in the problem of obtaining oxygen at a cost such as probably would permit of its use in bulk in industrial processes. We shall probably not be very far from the mark in saying that so far as Sir Arthur and some of the industrial processes with which he is associated are concerned a supply of oxygen at a cost of a few pence per thousand cubic feet would be followed by almost revolutionary developments in the field of fuel technology. For some years past it has been appreciated—and the matter has frequently been referred to here—that cheap oxygen would, to take but one example, lead to another renaissance in the gas industry, enabling the efficiency of some of the gas-producing processes at present in operation to be increased beyond all knowledge. Not only would cheap oxygen enable the well-known intermittent water gas process to be run on continuous lines, but some exceptional developments would undoubtedly occur with carbonization in vertical gas retorts, in connection with which it will be recalled that Sir Arthur Duckham was one of the pioneers.

Our own information some few months ago was to the effect that Sir Arthur was experimenting with an oxygen process which introduced the principle of selective absorption. From his patent specification it is now seen that his process, or at least one of his processes, makes use of the absorptive power of hæmoglobin for oxygen, and the subsequent liberation of the oxygen at a different temperature or pressure. Usually, difficulties arise owing to the fermentation of the hæmoglobin, but in the specification in question reference is made to the avoidance of this by introducing particular temperature conditions. That is to say, the temperature of the solution or suspension of the hæmoglobin is either at or below 0° C. or at about 57° C. which is just below the temperature at which coagulation takes place.

The New Process

Briefly, the process consists in one method of application, of circulating through an absorption tower a 12 per cent. solution of hæmoglobin in contact with a stream of air at, say, 0° C., the oxygen being recovered at the same temperature by a reduction of pressure. As regards results and efficiency it is interesting to note that the recovered gas forms about 10 per cent. of the volume of air treated, and it contains about 75 per cent. of oxygen. From the point of view of the standard of purity of industrial oxygen as we commonly know it to-day, this 75 per cent. gas would be regarded as decidedly low grade, but, as contrasted with air, it would undeniably form a most valuable product for a number of industrial processes, providing its cost was very measurably below existing prices. Moreover, the process is obviously designed for a special purpose, and it would in no way affect the demand for compressed oxygen of higher purity, for it is very doubtful whether it could be employed for such standard applications as cutting and welding. Meanwhile, it is interesting to recall that blood has already been called into use in connection with quite a number of industrial processes, for instance, in the manufacture of charcoal and in certain sewage precipitation processes.

During the week it has been our good fortune to be able to discuss the possibilities of this new process with Sir William Jones, who is well known as a keen business and technical colleague of Sir Arthur Duckham. Sir William pointed out that for two years they had given minute consideration to the problems of oxygen production, and that his firm had retained a special technical research worker (we believe this to be Mr. Finlayson) to examine the possibilities of methods both old and new. The method under review was the outcome of this work; but Sir William was not prepared to admit that they had really achieved success. The fact is that cheap oxygen is the will-o'-the-wisp of the chemical engineer, and it is of no use making it even if it is only moderately cheap. That is to say, it may be possible to produce the gas for 2s. per thousand cubic feet; but for the purposes described above it is essential to have it for something under a shilling per 1,000 feet.

Whatever may be the final opinion arrived at by Sir Arthur Duckham and his associates, we trust that, in the interests of those who are clamouring for oxygen, they have not abandoned the quest. Meanwhile, chemical and fuel engineers will not be unmindful of the debt of gratitude which they owe to Sir Arthur for sustaining the burden and expense of this valuable investigatory work. One important fact we have elicited is that the whole of the research records have been handed over to the Society of Chemical Industry to make such use of as they please. It is to be hoped that the Society—recognising its position of public trustee—will turn it to such account as will enable other interested workers to profit by Sir Arthur Duckham's altruism.

Sir James Dewar

By the death of Sir James Dewar, which occurred on Tuesday, in his 81st year, British chemistry loses one of its most distinguished representatives and, incidentally, a personal link with the great scientists of Victorian days. Educated at Edinburgh University, where he was a pupil of Lord Playfair, then Professor of Chemistry, he became later demonstrator of chemistry at Edinburgh and lecturer in the Dick Veterinary College. In 1875, at the age of 33, he was appointed Jacksonian Professor of Natural Experimental Philosophy at Cambridge, with a Fellowship at Peterhouse. Two years later he was elected Fullerian Professor of Chemistry at the Royal Institution, a post in which he had been immediately preceded by Tindall, and which he held up to his death. It was at the Royal Institution that he carried out the research and experiment which won for him recognition and distinctions from all parts of the world, and there, too, he delivered the " popular " Friday evening lectures which attracted equally scientists and laymen. Among the distinctions held by Sir James were the Fellowship of the Royal Society (elected 1877), and the presidency of the Society of Chemical Industry (1887–88), the Chemical Society (1898–99), and the British Association (1902).

Sir James will be remembered mainly for his great work on the liquefaction of gases. Working on simple scientific lines, he made use of the Joule-Kelvin " porous plug " effect to cool the gas and absorbed his liquefied product in charcoal, and in this way liquefied air, hydrogen, and finally helium. As a necessity to this work was the invention of the vacuum flask, which has since become so familiar a commercial article. The industrial applications of Professor Dewar's work are numerous already, and are increasing. Another important piece of work from an industrial standpoint was his collaboration with Sir Frederick Abel in the original production of cordite. An outstanding feature of Sir James Dewar's experimental work was the extreme simplicity of the apparatus he used, a simplicity of a kind that is only obtained by a thorough vision of the essentials of the work, and this quality makes his name worthy of coupling with our greatest scientists, such as Faraday, or even Newton himself. In private life he was a kindly man and a genial host. He was devoted to music and the arts, and his scientific studies were never allowed to exclude the larger human interests.

British Empire Exhibition

We understand that the Association of British Chemical Manufacturers have definitely decided not to organise a chemical section for the British Industries Fair of next year, but to concentrate on the chemical exhibits at the British Empire Exhibition. The former has been so successful during the past two years that many may regret its temporary discontinuance, but the policy adopted is regarded as almost the only one possible in the circumstances. Already the Association are busy on the preliminary arrangements, and are looking forward to an exhibition of a more ambitious kind than any yet organised. So many visitors from all parts of the world promise to visit England next year for the exhibition that the opportunity of demonstrating the character and resources of British chemical industry is a rare one, of which it is advisable to take the fullest advantage. In this connection may be revived a suggestion made to us at the recent British Industries Fair that a chemical plant exhibition might be organised on an independent basis.

Points from Our News Pages

A correspondent contributes some notes on Mr. G. C. Calvert's process for the precipitation and dispersion of rubber latex (p. 328).

The principal features of the Premier Mill and its various applications to industry are described by Mr. F. J. E. China (p. 329).

From a special report issued by the U.S.A. Bureau of Mines particulars are given of the properties, uses, and sources of supply of titanium (p. 331).

Reviews are published of a number of recently issued chemical text-books (p. 333).

Information is given relating to export trade, chemical markets abroad, methods of packing goods, the work of the Overseas Trade Department, etc. (p. 336).

Prices of chemicals, according to our London Market Report, remain very steady, with an upward tendency (p. 351).

Our Scottish Market Report states that prices asked for spot material of German manufacture continue to increase and that numerous inquiries are being received from Germany and the Continent (p. 354).

Books Received

Copper Ores. By Robert Allen. London: John Murray. Pp. 220. 7s. 6d.

The Phase Rule and Its Applications. By Alexander Findlay. London: Longmans, Green and Co. Pp. 298. 10s. 6d.

Surface Tension and Surface Energy. By R. S. Willows and E. Hatschek. London: J. and A. Churchill. Pp. 134. 6s. 6d.

The Spectroscope and Its Uses in General Analytical Chemistry. By T. Thorne Baker. London: Ballière, Tindall and Cox. Pp. 208. 7s. 6d.

Directory for the British Glass Industry. Compiled by G. S. Duncan. Edited by Professor W. E. S. Turner. Sheffield: Society of Glass Technology. Pp. 384. 7s. 6d.

The Calendar

April 4	Society of Public Analysts: Papers by Dr. S. White, B. S. Evans, G. W. Monier-Williams. 8 p.m.	Burlington House, Piccadilly, W.1.
6	Institute of Metals (Sheffield Section): Annual General Meeting. 7.30 p.m.	Mappin Hall of the University, Sheffield.
6	Society of Chemical Industry (Manchester Section): Annual General Meeting. "Activated Sludge Process of Sewage Purification-Nitrogen Recovery." E. Ardern, P. Gaunt, C. Jepson. 7 p.m.	Textile Institute, 16, St. Mary's Parsonage, Manchester.
9	Institution of Rubber Industry: "Rubber Pigments." Dr. D. F. Twiss.	Engineers' Club, Coventry Street, Piccadilly, W.1.
10	Hull Chemical and Engineering Society: Presidential address by R. Nelson. 7.30 p.m.	Grey Street, Park Street, Hull.
10	Society of Chemical Industry (Birmingham Section): "The Activated Sludge Process." F. R. O'Shaugnessy. "Catalytic Hydrogenation." E. J. Lush. 7 p.m.	The University Buildings, Edmund Street, Birmingham.

Rubber Latex Precipitates and Dispersions

Some Notes on the Calvert Process

Particulars contributed by a well-informed correspondent are given below of G. C. Calvert's new latex process. It is claimed that latex used in this form dispenses with the need for maceration in dough making and with the use of solvents, inflammable or other, for waterproofing, and that it also mixes with viscose, casein, etc., making compounds not hitherto possible and probably of industrial value.

For some time it has been realized by manufacturers that better articles can be made from the native rubber milk or latex than from the coagulated and latex-separated rubber only as usually sent home; so much so that in certain cases, despite the cost and inconvenience of shipping liquid latex (about 60 per cent. water), some of the largest manufacturers have decided to take all their rubber in latex form. Also, as all coagulated rubber, when received, has to be ground up or masticated, this operation is held by some to affect the nerve or quality of the rubber, and therefore is better avoided if possible. It is avoided when precipitated latex is used. Further, it is believed that certain substances in the milk serum are beneficial, and these are normally washed and squeezed out at the plantation during the coagulation as usually practised.

Advantage of the Process

The object of Calvert's invention is to obtain all the valuable constituents of the liquid latex in the form of a dry powder or granules or paste without the use of heat or complicated machinery, thus (1)saving weight in shipments, (2) dispensing with liquid containers, and (3) giving the manufacturer all the known advantages of the use of latex. It provides it in such a subdivided form as to constitute a new preparation of rubber, extending its uses to many trades, as well as providing the rubber in a more convenient form for general manufacturing use.

For the information of non-technical readers it may be explained that the normal procedure at the plantation consists of adding acid to the rubber milk when the rubber coagulates into a tough cake or sheet, leaving behind the other milk constituents. These sheets are washed, etc., dried, and form the crepe rubber as imported.

The Calvert Principle

The process is based upon the treatment of the latex, at the plantation or elsewhere, in such a way that instead of its rubber particles being caused to coalesce into a mass, as is the present practice, they are retained in the subdivided form in which they already exist in the latex. Each particle becomes coated with a condensate of the natural serum, as a paste, dispersion, or solid; these coated particles persist. Each particle consists of practically all the valuable latex constituents combined with a modicum of rubber.

Thus, there can be produced by this process: (1) Semi-dry (dispersible) or dry latex for export (process *a*) at plantation. (2) Finely dispersed manufacturer's products of rubber and vulcanizers or fillers (processes *c*, *d*, *e*). (3) Very cheaply produced rubber latex dispersions by process *b* in conjunction with *a* or *e*. (4) Ditto by process *g*.

The smallness of the rubber particles and their ready dispersion in water, etc., is of the greatest importance in various manufacturing processes, as well as the fact that they can be incorporated readily with fillers, etc., or the fillers coated therewith. It is claimed that this, accompanied by the fact that the whole of the desirable elements of the latex are conserved, gives this product an overwhelming advantage over all other forms of rubber.

Size and Production of Particles

(*a*) *Latex Only.*—By controlled action of reagents the size can be regulated within certain maximum limits of coarseness.

(*b*) *Latex Only.*—By (*a*), plus a subsequent run through a Premier mill, all particles can be brought to any given gauge.

(*c*) *Latex Plus Other Substances.*—By (*a*) depositing on to a prepared nucleus of given size such as china clay, paper dust, kieselghur, sulphur, or carbon.

(*d*) *Latex Only on Fabrics, etc.*—In the fabric of papers, textiles, etc., by regulation of action of reagent and state of latex.

(*e*) *Latex and Colloidal Substances.*—Joint precipitation of latex and colloidal nucleus such as casein, viscose, sulphur, alumina or silica.

(*f*) *Latex Ferments.*—By bacterial action on the latex under certain conditions.

(*g*) *Latex Dispersions.*—By adding reagent to latex while same is being run or circulated through a Premier mill.

This process can also be applied to waste serum, which can be supplied to manufacturers as a separate article, to be incorporated at will with rubber or other substances, giving an additional source of revenue to plantations practising crepe coagulation.

The Process

When latex is treated by this precipitation process the whole of the latex, other than water, is separated as a flocculent powder or granules containing the valuable milk constituents as well as the rubber, and which are readily drained or separated by gravity from the clear water residue. The size of the particles can be readily controlled.

The process is very simple, and consists of adding a small portion, usually about 1 per cent, of a cheap reagent to the liquid latex. A change immediately takes place. Whereas before the addition of the reagent the latex could not be separated from its water content by filtration or gravity or coagulated in a subdivided form, it can now be filtered, or if allowed to stand with an excess of water it will all rise to the surface in minute particles. According to the uses to which the product is to be put, a simple subsequent treatment is used to facilitate separation, and this can yield a cream, putty, or solid of subdivided rubber.

If conducted at the plantation only simple tankage plant is required; the cost is very low, and the process can be conducted by the same type of unskilled labour. In some manufacturing processes it is an advantage to treat the natural latex *in situ*, and sometimes the reagent is first added to or absorbed in a body—for instance, china clay—and this is then brought into contact with the raw latex, thus precipitating it in intimate union with the clay, or the reverse procedure. Or in other cases the cream or putty is used, made as aforesaid on the spot or at the plantation.

The Product

It is confidently stated that this process introduces rubber to the manufacturer in a new physical condition inasmuch as, although it can be handled as a liquid like latex by spraying, etc., contrary to latex, it is not an absolute emulsion with a tendency to deposit skins or pellicles of rubber, but a suspension of latex crepe with no such tendency, the deposition taking place as individual particles subsequently welded by the usual methods at the desired stage in the manufacture.

This fact has many advantages, especially for the coating of textiles, paper making, and building up of tyres and tubes, and doubtless manufacturers will find new applications for rubber as they realize the numerous advantages attendant upon the use of the raw material in this form.

For instance, in the manufacture of cardboard or lincrusts, whereas latex tends to dry on the outside first, forming a skin preventing the removal of the moisture from the inner portions of the mass, precipitated latex permits of the passage of water vapour between its particles (vacuum drying), consolidation by heat and pressure following in the usual way.

Some Industrial Applications

For proofing and making of rubber masses the process dispenses with the use of expensive and inflammable solvents. Casein, viscose, and other substances not hitherto combinable with rubber can be brought into intimate solution or semi-solution with rubber by this process for use in paper making, paints, plastics, treatment of fabrics, vulcanized articles, etc. Whereas ordinary liquid latex alone or admixed with pulp, etc., is difficult to control, often coagulating (probably owing to mechanical agitation) spontaneously at the wrong stage in the manufacturing process causing undue

shrinkage, the precipitant-treated latex is under full control, and, being readily suspensible in water, oils, etc., and filterable therefrom, may be incorporated with pulps, plastics, etc., with ease, subsequent heat or drying treatment fixing it at, and only at, the desired stage in the manufacture.

For this purpose either latex imported in the precipitated form (with attendant freight saving) or liquid latex treated by the Calvert re-agent before, during, or after incorporation with other substances such as paper pulp, plastics, etc., may be used. Moreover the Calvert reaction has the power of fixing dyestuffs, etc., in the mass, and fillers, sulphur, vulcanizing agents, etc., can be readily incorporated previous to, during, or after treatment with reagents, and may form part of or be impregnated with such reagent. Such masses may be readily manipulated, milled, moulded, etc., without risk of auto-coagulation previous to their finishing by means of drying, heat, vulcanization, or the like. The Calvert precipitates also readily lend themselves to treatment by the 2-solution or other cold vulcanizing processes, more so than rubber solutions, owing to their physical condition.

The "Premier" Mill in Chemical Industry

By F. J. E. China, B.Sc. (Lond.), A.I.C.

THE "Premier" Mill is not to be confused with those types of mill which are designed to produce true colloidal suspension of solids in liquids. During the last year or two the word "colloid" has been very loosely used, and it may be stated at once that the "Premier" Mill is not designed for producing true colloids. Its properties as a disintegrating and intensive mixer are unique in themselves, and will be better understood after a brief description of the machine.

Reference to the illustration will show that the mill consists of an outer casing which surrounds the rotor "R." This rotor consists of a perfectly smooth steel cone, which is made to extremely fine limits as regards accuracy, and fixed to the spindle "S.P." which is mounted in special bearings. This cone works in close relation to a fixed surface "C.S.," which forms part of the casing: the arrangement being very similar to the action of the clutch on a motor car. The working surface of the rotor "R.S." is arranged so that there is a very fine clearance between same and the surface of the casing "C.S." This arrangement gives a metal surface rotating in very close proximity to a fixed surface at a speed which may vary between one thousand and five thousand revolutions per minute. The rotor is driven by the pulley "P" mounted on the spindle "S.P." The bearings which control this spindle are mounted in a micrometer head "M.H.," which enables the clearance between the rotor and the cone "C.S." to be adjusted to any degree desired. The rotor should never be adjusted so that it actually touches the casing "C.S.," but it can be so regulated that the actual clearance can be anything from three thousandths of an inch to two or three hundredths, according to the nature of the work to be done.

It is essential to realise that when the machine is being used with hot material one must take into consideration the fact that the machine expands on heating. A fine clearance should not be set, therefore, until the machine is thoroughly heated up. It is a golden rule never to use a finer clearance than is necessary for the job; in the same way, never use a higher speed than is necessary. When operating the mill the material to be dealt with is fed in through the inlet "I" at a suitable rate; it then passes through the fine film between the conical surfaces, and owing to the enormous speed of the rotor the particles of solid suspended in the film are rapidly torn apart. If two liquids, normally immiscible, are being fed through the film their particles become so finely divided that they mix and form an emulsion of the two liquids.

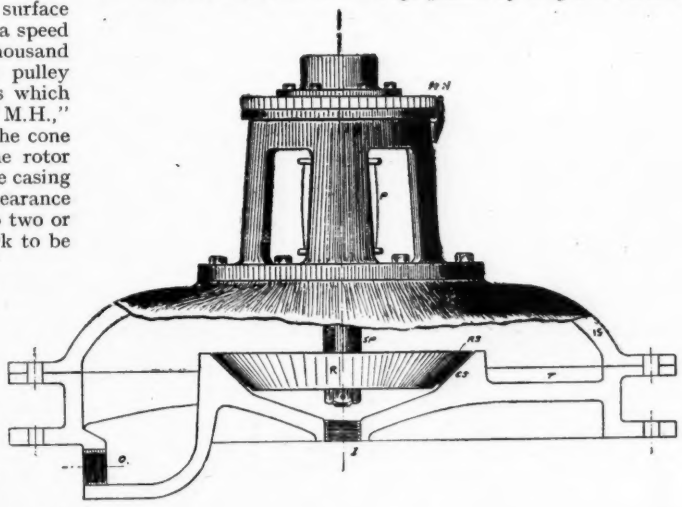
Emulsification of Liquids

The study of emulsions as applied to commercial processes is one which has received peculiarly little attention at the hands of chemists: one reason being that it is very difficult to produce emulsions of many liquids without using tremendous quantities of stabilisers. The results of research have shown that a stable emulsion can be made in the "Premier" Mill with the use of very small quantities of stabiliser. In most cases the same stabilisers are used that have been usual for many years in the preparation of emulsions in general. If an emulsion is really well prepared it should be possible to boil it or subject it to a temperature of 100° C. for a considerable time without breaking it down. On the other hand, it should be possible to freeze it without causing any change in its physical state beyond that of solidifying.

It is believed that up to the present moment very few artificial emulsions will stand this test except those made in machines of the "Premier" or "Plauson" type. It is not proposed to enter into any theoretical considerations at this stage as, in the writer's opinion, theories are so conflicting as to be of little help to the practical man. It will be readily understood that every emulsion needs special consideration, and that by no general rule is one enabled to prophesy whether a certain oil can be emulsified with water.

It will also be understood that an emulsion is like a house built of bricks in that with the same number of bricks the house can be built in many different ways. That is to say, one can have several emulsions consisting of 50 per cent. of an oil and 50 per cent. water and yet each emulsion will vary in structure and will in consequence behave in a way peculiar to itself.

The control of the structure of emulsions can only be carried out with the aid of the knowledge gained by long and careful



research. There are very few oils that cannot be successfully emulsified with water in the "Premier" Mill. An example of a difficult emulsion to make is that of, say, coal tar oil containing 30 per cent of pitch. This mixture can readily be emulsified, giving an emulsion dilutable with water. The emulsification of creosote and water is now a simple matter, and the "Plexosote" process, as developed by Burt Boulton and Hayward, Ltd., is an interesting example of the application of an emulsion to a large industrial process.

One of the most important processes developed and made possible by the "Premier" Mill is that of preserving timber economically by the use of an emulsion of creosote and water. In the ordinary way timber is treated under high pressure with creosote oil, with the result that the wood is impregnated to a certain depth with the creosote. It is obvious that the depth of impregnation is important, because if the wood cracks slightly on the surface it is necessary that unimpregnated wood is not exposed. The process is expensive, and this cost prevents many people from using it.

By means of an emulsion of creosote and water it is possible to obtain exactly the same depth of impregnation with a fraction of the amount of creosote depending on the strength of the emulsion used. In practice one uses an emulsion containing from 30 per cent. to 50 per cent. of creosote. This emulsion is so stable that it can be boiled or frozen without change of composition, and when forced into the timber we find that the emulsion slowly breaks down and uniformly covers the whole of the cell walls of the timber with a thin layer of creosote. By this process many districts in the tropics are able to utilise the extraordinary preserving qualities of creosote at a fraction of the cost of using the older creosoting processes.

Emulsions of creosote and water are also extremely useful for the more superficial treatment of timber—*e.g.*, fencing, bungalow work, etc., is easily treated by painting with emulsion instead of with creosote oil. Where climatic conditions only require a thin layer of creosote, then an emulsion serves the purpose admirably.

As a general rule, we might say that it is possible to emulsify almost any oil, light or heavy. As a matter of interest more than of practical use it is instructive to note that a motor car has been run on an emulsion consisting of 20 per cent. of water and 80 per cent. petrol. The only alteration which was made to the carburettor was the insertion of a slightly larger jet and the removal of the fan belt. The latter was removed in order to compensate for the heat which is removed from the engine in the form of steam generated by the water portion of the emulsion.

Intensive Mixing of Liquids and Solids

If two or more immiscible liquids be passed through the "Premier" Mill, then these liquids are broken down into such an extremely fine dispersion that the area of contact surface is increased thousands of times. It follows, therefore, that if one is trying to get chemical reaction between the two immiscible liquids, then the time of reaction under these conditions is rendered almost negligible; in other words, one has almost instantaneous reaction. The above fact is made use of in extraction problems; for example, if one requires to extract tar acids from tar oil by means of caustic soda and the requisite quantities of tar oil and caustic soda are run simultaneously into the "Premier" Mill, then reaction takes place at once. Using this fact, a tar acid extraction plant has been designed which requires the use of no tanks and the washed tar oil and carbonate are run away from the plant simultaneously and continuously.

Minute Disintegration of Soft Solids suspended in Liquids

The theory of the action of the "Premier" Mill, as we understand it in the light of our present knowledge, is that the film of liquid is actually sheared under conditions which do not permit of the liquid acting as a liquid but as a solid. We assume, therefore, that particles in the line of shear must themselves become disintegrated during the shearing.

This theory explains why it is that if certain soft solids be suspended in liquid and passed through the mill, then they become disintegrated to a fineness far beyond what one could obtain by any form of grinding. It is well known, of course, that in ordinary grinding, if one goes beyond a certain limit, particles merely coalesce again, and in order to get beyond this limit one must make use of certain protective bodies which simply coat each particle with a thin film and prevent coalescing. Going back in history we find that this fact was first made use of by the Chinese, who two thousand years ago used to grind their white and black pigments in the presence of gum water in order to get them extremely fine. Modern research permits one to improve upon this in some ways, and also shows us that different materials require the addition of different materials in order to prevent that coalescing when reduced to an extremely fine state of sub-division.

There are many other conditions which must be taken into consideration when one is attempting to grind a material into an extremely fine state of sub-division, and the failures which might have taken place in the past are almost wholly due to the neglect of these precautions. It is not claimed that the "Premier" Mill can reduce solids to the colloidal state, and it has already been explained that this finer stage can only be carried out by means of the "Plauson" Mill. In the "Premier" Mill, however, very large quantities of material can be dealt with, giving a final product that is extremely fine, though not necessarily colloidal.

Extraction of Fibrous Tissues

If any material of a fibrous nature (providing it is not too tough) be passed through the "Premier" Mill, the powerful disintegrating action at work tears the fibre to pieces and exposes the whole of the tissue to the action of the suspending liquid. This is true for all meat and animal tissues and for most vegetable tissues, *e.g.*, if chopped meat be passed through the "Premier" Mill together with a shearing medium of water or other liquid then the whole of the soluble content of the fibre is at once passed into the liquid and the meat fibre remains absolutely torn to bits and quite colourless. The advantages of this phenomenon are readily seen when one considers that from 1 ton to 30 cwt. of meat can be thoroughly extracted in the cold in one hour for an expenditure of about 2s. or 3s. In the same way vegetable extracts can be made under such conditions as cannot be carried out by ordinary plant.

One very remarkable case is that of Cinchona bark. This bark can be entirely extracted of alkaloids in the cold in the following manner:—The bark is ground up in the ordinary way. It is necessary to dry it. It is mixed with the requisite quantity of lime and passed through the mill once with the requisite solvent. Complete extraction of alkaloids takes place. This is an enormous improvement on the percolater extraction processes still in use. The same process may be applied to any vegetable tissue and is equally successful in the manufacture of perfume extracts.

Paints, Enamels and Printing Inks from Soft Pigments

It is not every pigment that will give satisfaction under this heading, but in the case of the softer varieties, such as are used for making enamels and printing inks, a process is available whereby from 20 to 60 gallons per hour of enamel or printing ink may be made. It is only necessary to mix the oil or varnish with the pigment in a very rough manner and pass the whole through the mill in a continuous stream. One will find that all aggregates of pigment are broken down and each and every particle becomes thoroughly saturated with oil or varnish.

There is no wear or tear in the machine, and when one considers the expense of getting grinding rollers in condition in a paint works one realises fully the value of a machine which will enable one to make a considerable number of the products of an enamel or printing ink works by means of a plant which is so economic in upkeep and running expenses.

Regeneration of Milk from Milk Powders

The regeneration of milk from any type of milk powder is an extremely simple operation with the "Premier" Mill and from 800 to 1,000 gallons per hour can be made, if necessary, with the greatest of ease. At the same time, the mill can be run to give a fraction of this output. Artificial creams and special confectionery creams can readily be made in the mill, and doubtless there are many operations in the baking and confectionery business which we have not yet had the time to investigate and in which the "Premier" Mill will prove invaluable.

The above list by no means exhausts the possible uses of the "Premier" Mill. Experiments are being made in various directions which will no doubt lead to extensive developments in connection with a number of commercial undertakings.

Non-corrodible Alloys

A SYMPOSIUM and general discussion on the subject of the "Resistance of Alloys to Corrosion" will be held at the Department of Applied Science, the University, Sheffield, on Friday, April 13, beginning at 3 p.m. The meeting is being organised jointly by the Faraday Society, the Sheffield Section of the Institute of Metals, and the Manchester Metallurgical Society. The discussion will include the new non-corrodible, non-ferrous alloys, such as stainless nickel silver and the nickel-chromium alloys, as well as stainless iron and steel. A general introduction to the discussion will be given by Professor C. H. Desch, F.R.S., and numerous contributions of interest are expected. Further particulars may be obtained from Mr. G. R. Bolsover, Brown-Firth Research Laboratory, Princes Street, Sheffield, or from the Secretary of the Faraday Society, 10, Essex Street, Strand, London, W.C.2.

Titanium: Its Uses, Properties, and Sources of Supply

By R. J. Anderson

The author, who is metallurgist to the United States Bureau of Mines, reviews the present state of knowledge of the element titanium, with special reference to the practical uses of its alloys.

FEW elements have received more attention and developed greater interest in the last ten years than titanium. The substantially pure metal has been difficult to isolate, and so far has been little employed commercially, but the use of alloys and chemical compounds of titanium has increased markedly in recent years. The earlier attempts at preparing pure titanium resulted in various impure forms, which, from their metallic appearance, were always mistaken for the metal. Hunter in 1910 isolated pure titanium by the reduction of titanium tetrachloride with sodium.

Physical Properties of Titanium

Many of the determinations made prior to 1910 on the physical properties of titanium are valueless because the pure metal was not available. Many of its properties have not yet been determined on account of the difficulty of obtaining a sufficient quantity of pure metal. Substantially, pure titanium has a silvery white colour like that of polished steel, and its fracture is similar to that of steel. It is hard and brittle when cold, but at a low red heat is malleable, and can be forged readily like iron. Attempts at drawing into wire have not been successful. The specific gravity of the metal is 4·50, and the melting point 1,800° C. (Hunter). The atomic weight is 48·1. Titanium forms alloys with some metals, notably iron, copper and manganese, and certain of these alloys have commercial uses. They have been studied only slightly as to their thermal equilibria. Lamort has determined the melting points of the iron-titanium alloys containing up to 21·5 per cent. titanium, and has constructed a partial diagram, finding that the eutectic occurs at about 13 per cent. titanium, which melts at 1,300° C.

Chemical Properties

Titanium belongs to the fourth group, which includes also silicon, zirconium, cerium and thorium, and markedly resembles these elements, particularly in its tetravalency, although it has a lower valence in some combinations. Titanium, like zirconium, is a weak base-forming or acid-forming element, according to conditions, and, theoretically at least, is truly amphoteric. Titanium combines with oxygen with incandescence at 510° C. When heated with the halogens and oxygen to incandescence it forms halogen and oxygen salts, and with sulphur and carbon it forms sulphides and carbide. Titanium combines avidly with nitrogen, resembling in this respect both boron and magnesium; the reaction commences at about 800° C., and when the combustion occurs in air the oxides as well as the nitrides are formed. Titanium dissolves readily in hydrofluoric acid, cold, dilute sulphuric acid, aqua regia, and hot concentrated hydrochloric acid; more slowly in nitric acid and in acetic acid, and it decomposes steam at 700° to 800° C. Since its chemical properties have not been studied fully, some of the statements in the literature will be open, no doubt, to subsequent revision.

Uses of Titanium

Titanium has a very restricted commercial employment in the substantially pure state, but it is used for a number of purposes in the form of alloys and as salts and compounds. The useful products into which titanium enters as an important constituent may be grouped as follows:—

1. Metallic alloys, such as ferro-titanium and cuprotitanium.
2. Incandescent media for lighting purposes, including gas mantles, arc-lamp electrodes, and filaments for incandescent electric lamps.
3. Mordants and dyes for leather and textiles.
4. Refractory colouring material for use in ceramics and in the manufacture of artificial teeth.
5. Pigments for painting, such as titanium dioxides.
6. Smoke screens for concealment in modern warfare (titanium tetrachloride).
7. Miscellaneous, such as the use of rutile for gems, and of pure titanium for the production of spectra in astronomical research.

Of the titanium alloys, only four are in commercial use, namely, ferrocarbon titanium, ferrotitanium, cuprotitanium, and manganotitanium. Ferrocarbon titanium and carbon-free ferrotitanium are employed as deoxidisers and denitrogenisers in steel practice, cuprotitanium and manganotitanium are used as deoxidisers in brass and bronze practice. On account of their metallurgical importance these four alloys are described in detail later.

Incandescent Lights

An important use of titanium and certain of its compounds is for incandescent lighting. Certain compounds have been employed in the manufacture of arc-lamp electrodes, filaments of incandescent lights, and in gas mantles. The value of titanium and its compounds as illuminants is due to their high fusion and vaporisation temperatures, and to their radiative efficiency. Filaments of metallic titanium have a high melting point and high resistance, and as used for electric bulbs are made first by treating titanium dioxide with cold ammonia; then the product is heated in vacuum to 1,200° C., and mixed with an organic binder such as a solution of casein in ammonia. The mixture is formed into threads, heated in an electric furnace at 1,200° C., and the filament subjected to a high-tension electric current in vacuum. Arc-lamp electrodes have been made of rutile, ilmenite, iron-titanium alloys, and titanium carbide. The use of titanium and its compounds for lighting purposes has been dealt with extensively in the periodical and patent literature.

Dyes and Mordants

For use in the dyeing industry, titanium was exploited first in England by Barnes. In general the *titanous* salts are powerful mordants which produce brilliant and stable colours. The salts used commercially are the sulphate, chlorides, fluoride, oxalate, tartrate, lactate, and the double alkali derivatives of these salts. The titanium compounds that have been successfully used in this connection find application as mordants and dyes for wool, cotton, mixed goods, and for paper. Titanium-potassium oxalate ($TiOC_2O_4$, $K_2C_2O_4$, H_2O), titanium-sodium sulphate ($Ti_2(SO_4)_3 \cdot Na_2SO_4 \cdot 5H_2O$), titanous chloride ($TiCl_3$), titanous sulphate ($Ti_2(SO_4)_3$), titanous sulphocyanide ($Ti(CNS)_3$), and others, have found extensive application. Salts of titanium have been used also in dyeing shoe leather, and do not embrittle the leather as with salts of iron.

Sources of Titanium

Titanium is present almost invariably in igneous rocks and the sediments derived therefrom. It is a characteristic constituent of certain pyrogenatic compounds, and occurs in various mineralogical forms, chiefly as oxides, titanates, and silico-titanates, and in many silicates. Of 800 igneous rocks analysed by the U.S. Geological Survey, 784 contained titanium. Clarke has estimated the amount of titanium in the solid crust of the earth to be 0·44 per cent., equivalent in oxide to 0·73 per cent., the element thus standing in ninth place in the scale of abundance, next to potassium. Although widely distributed, titanium rarely occurs in abundant amount in any given locality except in the titanic iron ores and titaniferous magnetites. At present there are four known ores of titanium, namely, rutile, ilmenite, titaniferous magnetites (and titanic iron ores), and certain complex monazite sands. Titanium is often found in fairly large quantities in bauxites, and these might be a source of titanium—the latter to be recovered as a by-product in the production of alumina.

As would be expected, these ores are the commonest occurrences of titanium; namely, as the oxide (rutile, TiO_2), as iron titanate (ilmenite, $FeTiO_3$), as iron ferrate (magnetite, as intergrown ilmenite), and as complex sands (bearing zircon, rutile, ilmenite and monazite). The principal source of titanium for many years was rutile, but the known workable deposits of that mineral are few and widely scattered; and the greatly increased demand for titanium in recent years has made it necessary, for some uses, to turn to ilmenite and high titaniferous magnetites.

Rutile is found as a pyrogenetic constituent in eruptive rocks, and as an alteration product. It is found commonly in gneiss, mica-schist, and the phyllites. The composition, when pure, is TiO_2, which is brittle, has a hardness of 6 to 6·5 (Moh), and a specific gravity of 4·18 to 4·25. The known deposits of commercial importance are confined to three localities in the United States, and one each in Canada, Europe, and Australia.

The so-called titanic iron ores include ilmenite and titaniferous magnetites. These minerals are widely distributed. Ilmenite is the only one of many titanates which is important as an ore of titanium. It is a common constituent in diorite, gabbro, diabase, basalt and related rocks. Important deposits of ilmenite occur in the United States, Scandinavia, Russia, Australia and Africa, but the commercial production has so far been limited. Magnetite corresponds to the composition $FeO.FE_2O_3$, and in many localities this mineral contains TiO_2 (when it is known as titaniferous magnetite) ranging in amount up to 20 per cent. As previously indicated, titanium is a usual constituent of bauxite, and is removed in the preparation of alumina.

Titaniferous Iron Ores

With reference to the direct smelting of titaniferous iron ores in the blast-furnace, it has been shown definitely by Rossi, Heskett and other workers that these ores can be smelted readily for the production of pig iron, and large-scale tests have been run at Port Henry, N.Y., and Onehunga and Patea, New Zealand. Moreover, at some blast-furnace stacks in Norway, Sweden and England titaniferous iron ores were smelted as such in recent years; and there is certainly no question but that such ores can be smelted successfully and commercially. However, blast-furnace operators are generally prejudiced against titaniferous ores, and while this prejudice is not reasonable nor based on reliable data, nevertheless it exists.

Manufacture of Titanium Alloys

Of the four titanium-bearing alloys that are produced commercially—ferrocarbon titanium, carbon-free ferrotitanium, cuprotitanium and manganotitanium—the first two are produced in relatively large tonnages, but the latter two only in subordinate amounts. Iron-bearing titanium alloys are made either in the electric furnace by carbon reduction (ferrocarbon titanium) or by the aluminothermic process (carbon-free ferrotitanium). The latter has been produced also by reduction of ilmenite with silicon.

Ferrocarbon titanium is made by the electric-furnace reduction of ilmenite with coke (or of rutile with carbon in a bath of liquid iron or steel). This yields an alloy high in carbon (5 to 8 per cent. C), and the carbon can be reduced by remelting with rutile as a decarburiser. A number of patents have been secured pertaining to the decarburisation of low-carbon ferrotitanium. Ferrocarbon titanium contains 15 to 18 per cent. Ti, about 7 per cent. C, 1·5 per cent, Si, the rest being iron, and impurities in small amount. Carbon-free ferrotitanium is made by the aluminothermic process, wherein ilmenite is reduced with aluminium, and the alloy contains 25 per cent. titanium, and 5 per cent. aluminium, these proportions being aimed at so that a low-melting-point titanium aluminate ($TiO_2+Al_2O_3$) is formed on addition to a steel bath. It also contains 1 to 1·5 silicon, the rest being iron and small amounts of impurities. The iron-titanium alloy made by the aluminothermic process is much more expensive than that made by carbon reduction.

Cuprotitanium is made by the aluminothermic reduction of rutile to which copper has been added, and manganotitanium is produced similarly by the reduction of rutile to which manganese has been added or by the reduction of a mixture of rutile and manganese oxide. These alloys must be kept free from iron, hence ilmenite cannot be employed as a source of titanium. Ferrotitanium alloys are made by fifteen manufacturers in Germany, three in Great Britain, two in France, and two in the United States. Switzerland and Sweden are also producers.

Titanium in the Metallurgy of Steel

Titanium is used ordinarily, in the form of an iron alloy, as a final deoxidiser and denitrogeniser in the manufacture of steel, following the usual treatment with a ferromanganese, or spiegeleisen, and ferrosilicon. Titanium, because of its strong chemical affinity for oxygen, will remove traces of oxygen from steel which otherwise does not yield to the ordinary deoxidisers with their concomitant carburising reactions; and in removing nitrogen it is one of the few elements that combine with this gas. Titanium tends to lessen segregation in steel ingots. As a ferro-alloy it is added after the other usual deoxidisers; in steel practice it is put into the ladle while the steel is being poured, before the slag has begun to run, and the ladle is held for five or ten minutes before teeming into ingots. For open-hearth structural steel, about 0·03 per cent. titanium (as ferro-carbon titanium) is added, and practically no titanium will be found in the resultant steel. With carbon-free ferrotitanium, from 0·5 to 1 lb. of the alloy is added per ton of steel, depending upon the kind and condition of the steel. In Bessemer practice the alloy is shovelled into the stream of steel as it is poured from the converter into the ladle.

Titanium has been used for a number of years in the production of Bessemer rail steel, but the employment of Bessemer rails fell off markedly for several years prior to 1914 owing to the ascendency of the open-hearth process in making rail steel; consequently the amount of iron-titanium alloys used in the manufacture of Bessemer rails decreased rapidly.

Titanium is used to a considerable extent in the United States in the production of high quality structural steels, and a number of alloy-steel makers report such use as of especial value. The employment of titaniuni yields a cleaner and sounder steel. During the war, in connection with the conservation of manganese, numerous experiments were carried out for the purpose of substituting ferrotitanium alloys for ferromanganese either in whole or in part; part substitution was effected successfully at several plants, and at one they were able to reduce the usual amount of ferromanganese by about 50 per cent. by adding ferrotitanium in the ladle. The relative deoxidising power of titanium as compared with the other usual steel deoxidisers is as follows:—(Boylston): (1) aluminium; (2) silicon; (3) titanium; and (4) manganese. This rating is given as to the effect of the deoxidisers on soundness—that is, freedom from blowholes in steel ingots.

Referring now to the use of titanium as an alloying element for steel, the question at present is much shrouded in secrecy. Rumours of the use of titanium-alloy steels for armour-plate have been circulated, but so far as is known to the writer no merit has been found in the addition of titanium to steel as an alloying element, and experiments with steels containing 0·1 to 1·0 per cent. titanium have shown no special advantages. A more interpretative investigation than any so far carried out is required to distinguish more clearly the merits of titanium-alloy steels, and it must be assumed now, pending exact proof to the contrary, that these steels are of no particular value, or at least yield no advantage not provided by other steels. It is rather difficult to get the carbon-free ferrotitanium to alloy with steel without much loss of titanium, and this fact, coupled with the high price of the carbon-free alloy, has tended to discourage experimentation by steel makers in this direction. It is possible, however, that if the cost were less some combination of titanium, either alone or with other metals, might produce valuable steels for some purposes, and experiments need to be carried out.

Titanium in the Metallurgy of Iron

In the manufacture of cast iron, titanium is used to some extent, 2 to 4 oz. of the ferro-alloy to 1 ton of steel being scattered along the cupola runner prior to tapping. Stoughton has discussed the effect of titanium on cast iron at length, and Moldenke has published the results of his experiments as to the effect of titanium on the properties of gray iron and white iron. The claim has been made that titanium reduces the amount of chill and at the same time makes a harder chill, which is obviously doubtful, but that it actually does reduce the amount of chill has been proved, and this action is readily understood since titanium removes sulphur, which is productive of chill. Titanium also acts in a manner analogous to that of silicon—namely, it will throw down graphite and prevent the precipitation of Fe_3C. The addition of titanium is useful in cast iron foundry practice for deoxidation and denitrogenisation where special cast iron is to be made.

It has been found also that the addition of titanium to iron improves the magnetic qualities owing to the cleansing action of the titanium, but that titanium-iron alloys have poorer magnetic qualities than the titanium-free iron.

Reviews

FLAVOURING MATERIALS—NATURAL AND SYNTHETIC. By A. CLARKE, F.C.S. London: Henry Frowde and Hodder and Stoughton. Pp. 166. 8s. 6d.

A volume of this size cannot pretend to give more than a short account of the materials used in this industry, and this book necessarily suffers from undue compression. After an introduction describing the organs of taste and smell, a section of 26 pages is devoted to the characters, analytical constants, and microscopic examination of about a dozen of the chief spices and condiments. Micrographs of some of these are given, but they have very little value, as the detail is not good. We presume the author's intention is to direct attention to the type of information that is available without necessarily giving full details.

There follows a description of miscellaneous materials chiefly derived from the vegetable kingdom. Among these one notices aloes, colocynth, rhubarb and senna—drugs more suitable in a book of medicine than in one on flavouring materials. If such things are actually used as flavours it would have been preferable to draw attention to the fact that these purgative drugs need not be used in this way, because there are other harmless substances from which a bitter effect can be produced.

Chapter 6 is devoted to an account of the chief essential oils, but here again the compression of this into 34 pages greatly reduces its value. The same remarks apply to the description of synthetic substances that follows.

The author states in the preface that the notes are intended to form a work of reference more comprehensive than has yet been published, but it will be seen from the above account that it is quite impossible to compress into a book of 166 pages any such scheme, and the chief value of the book lies in its suggestiveness to those engaged in the industry.

Several typographical errors have been noticed, which should be corrected. Cinnamomum Zeylanicum is spelt C. Zelanicum in several places, and also in the index; Rhamnus Cartharticus for Rhamnus Cathartica. There is no excuse for the statement on page 28 that sand is the amount of ash soluble in hydrochloric acid, and the statement in describing a method of determining the boiling point "that extreme accuracy is obtained if the portion of the thermometer which is not surrounded by the vapour is allowed for according to the (well-known) formula" is very liable to mislead. The author must know that there are other important considerations to be taken to obtain "extreme accuracy."

A pleasing feature of the book are the references to current literature. The paper and printing are excellent.

BRIQUETTING. By Albert L. Stillman, M.Sc. The Chemical Publishing Co., Easton, U.S.A. Pp. 466. $6.

"What is the difference between a brick and a briquette?" The question appears simple, but the answer is not altogether easy to supply. Mr. Stillman starts this topical volume by telling us that if a press makes blocks out of fine material and those blocks go to form units in a building, thus entering a long life of usefulness, then the press has made a brick. If, on the other hand, the press turns out a block which is ultimately burned or otherwise consumed then it has made a briquette. Apparently, therefore, we can broadly differentiate between the two by saying that bricks are made to last and briquettes are made to be destroyed.

The space given to this explanation is, however, the least important part of the author's volume. The science of briquetting—for the process certainly is developing into a distinct science—has been markedly stimulated by the attention which has within recent years been given to the conservation of fuel and the utilisation of products which have for too long been considered merely as waste. In this country quite a number of investigators have lately been turning their attention to the fabrication of composite fuels which might find a use in the home or in industry. It would seem that the not altogether successful quest for a really satisfactory semi-coke, deprived of its irritating property of friability, has been partly responsible for directing attention to pressed fuels; and those who have thirsted for information as to what ground has already been covered by briquetting authorities have suffered severely from the lack of a text-book on the subject. As a matter of fact, up to the publication of Mr. Stillman's volume the only text-book which was available was *The Handbook of Briquetting*, by Professor Franke, a book of which there is an English translation by Professor Lantsberry. The author has, accordingly, taken advantage of a rare occasion at a particularly opportune time, a fact for which his English readers will be grateful.

Throughout the world thousands of tons of briquettes are manufactured every year from all manner of raw materials, but it seems probable that within the next few years the output will be very considerably increased. Herein, therefore, lies very considerable scope for the fuel and metallurgical engineering chemist. In the main, so far as briquetting is concerned, there are three classes of materials, namely (*a*) those requiring no admixture, or at the most a slight dampening prior to making up, (*b*) those which by the addition of a small quantity of reagent become self-cementing and briquette satisfactorily under low pressure, and (*c*) materials such as coal and breeze which require a binder. By far the most important branch of the industry is that in which fine material is mixed with a binder, but although we are prone to regard a briquette merely as a form of fuel the fact must not be overlooked that the process also finds considerable use in machine shops for the pressing up of metal swarfs. Very considerable advantages ensue from this treatment. Transportation and handling charges are measurably lowered, time is saved in the operation of charging the metal furnaces, while losses from oxidation due to the great surface of metal exposed when the latter is in the loose state are largely avoided. The author certainly appears to have overlooked none of the many ramifications of his subject, and there can be few in charge of industrial works who would fail to find some point or other which is applicable to their own conditions. A. M.

THE THEORY OF EMULSIONS AND EMULSIFICATION. By W. CLAYTON, with a Foreword by PROFESSOR F. G. DONNAN. London: J. and A. Churchill. Pp. 160. 9s. 6d.

Anyone who has tried to get a clear idea as to the generally received theories of emulsions will have been struck by the difficulties which are met with owing to the fact that the literature is so widely scattered. The importance of the study of emulsions is perhaps not fully recognised, and Professor Donnan does good service in pointing out the numerous practical applications of the laws of emulsion that are met with in our everyday life. It is, however, not only from the practical standpoint that the work is of importance, but from the theoretical standpoint information of the greatest value for colloidal systems generally can be obtained from the study of emulsions, which, though generally coarser in texture than typical colloids, are nevertheless in many respects much simpler to work with. Dr. Clayton has done his fellow chemists good service in bringing together such an admirable précis of the widely scattered literature on the subject of emulsions. He has presented the subject very objectively, but the interest of the book is greatly added to by the way in which he frequently points to directions along which further research is necessary or desirable. After having given a clear and unbiased account of the work done in some departments of the chemistry of emulsions the author is not afraid to give utterance to his own opinion, all of which adds to the human interest of the work. The early chapters are devoted to emulsifying agents, the properties of emulsions, and the earlier theories of emulsions, while the literature of the subject appears to have been studied most comprehensively. The following chapters deal with adsorption at liquid-liquid interfaces, dual emulsions and the inversion phases, and the modern adsorption theory, which latter is thought by the author to have the greatest weight of evidence in its favour. The interesting and commercially important subject of phase inversion is very adequately dealt with.

Describing the means employed to obtain physical measurements in emulsions, the lack of accurate quantative methods is emphasised. The concluding chapters deal with the technical application of the theories which have been discussed in the earlier portion of the book. The bibliography is given at great length and is extraordinarily complete. The whole subject is dealt with in such a full and interesting manner that the work can be read with pleasure and profit by students in any branch of chemistry, but to those specialising in colloidal chemistry the work is practically indispensable.

The volume, published by Churchill in their series of text books on chemical research and engineering, is well printed, clearly illustrated, and well indexed. W. R. ORMANDY.

THE NITROGEN INDUSTRY. By J. R. PARTINGTON, D.Sc., and L. H. PARKER, M.A., D.Sc., F.I.C. London: Constable and Co. Pp. 336. Price 21s.

The authors were on the research staff of the Nitrogen Products Committee of the Ministry of Munitions, and did a good deal of work on the Final Report of that Committee. The book gives much information not then available, especially of the German plants. It has a very strong personal note, and the authors lash out vigorously at those responsible for the backwardness of nitrogen fixation in this country. It is by ventilating such opinions that the general public will eventually become alive to the fact that we, who were the first to lead the way in nitrogen fixation with the work of Priestley, Cavendish, Rayleigh, Crookes, and others, are to-day hopelessly behind an actual accomplishment: As the authors says in the preface: "She (Britain) is now the only great power in the world which has not within the gates of her territory the necessary means for the synthetic production of nitrogen compounds for the purposes of peace and war."

When war was declared, Germany was quickly prevented from obtaining supplies of Chile nitrate, but they had prepared for that by laborious and costly research. Various methods of making nitrates from air had been perfected, and existing plants were soon extended and new ones built.

Britain had to depend on Chile nitrate, and the authors emphasise the fact that the submarine activity in 1918 by Germany led to a state of affairs which was perilous in the extreme.

When America entered the struggle she started to erect four imposing plants for the manufacture of nitrogen componds from the air. France and Italy also made solid contributions to the solution of the problem. Great Britain was the one Allied country which signally failed to do her share of the work. The authors have no doubt as to where the trouble lies. They say:—

"The nitrogen problem is one in comparison with which the political bickerings, known as 'statesmanship,' shrink into insignificance. The problem can be solved only by experimental research, and as the pinch becomes increasingly tighter, the true relative importance of science and politics may be expected to become more and more apparent."

I, personally, happen to know that many of those in political and military control were not aware that sulphuric acid was absolutely essential for the manufacture of nitric acid and explosives from Chile nitrate. At the very time when fixed nitrogen and sulphuric acid were essential for home use, they were actually being exported from the country. Referring to this the authors say:—

"At the very time when fixed nitrogen in the form of Chile nitre was being imported into the country at great risk and expense, no less than 60 per cent. in 1915, and 70 per cent. in 1916, of our own source of combined nitrogen—ammonia—was being exported! Not only was this drain permitted, but large quantities of sulphuric acid, urgently needed for the manufacture of munitions, were used for the production of this exported ammonium sulphate. At a time when every effort was being made to increase the output of sulphuric acid for munitions, 294,000 tons of chamber acid in 1915, and a minimum of 259,000 tons in 1916, were actually sent out of the country in the form of ammonium sulphate."

At a comparatively late stage of the war, when the menace of starvation to Great Britain became very real, the authorities began feverish preparations to make nitric acid from air. Some research work was done at University College, and at the time of the Armistice a start had been made in a national factory at Bellingham-on-Tees, which the authors describe as "the erection of a few sheds on a site convenient for Zeppelin attack." To emphasise these dilatory ways, they say that the Germans built an immense factory at Merseberg on the Haber system, and had it in full working order within a year.

As regards technical information, this is one of the best text books that has appeared in recent years, and in stating this I am not depreciating a recent book by Dr. J. N. Pring, because he covered a wider field. I may also lay some claim to be impartial, because while others have been good enough to give my own work some notice, Messrs. Partington and Parker apparently do not know of my existence. But what they do say is said with a downrightness and an emphasis that I entirely approve. I was especially pleased to see the following paragraph, because there has been much tiresome nonsense said and written regarding relative amounts of power used by various processes:—

"Every process of nitrogen fixation is dependent on cheap power. It is usually assumed that the synthetic ammonia process is an exception in this respect, but the large requirements in cheap hydrogen of that process amount to the same thing as cheap power, since the hydrogen has to generated by electrolysis of water, requiring electrical energy or prepared from water gas, in the manufacture of which large quantities of coal are consumed—*i.e.*, potential sources of energy."

Three years ago, in some evidence I gave before a Senate Committee at Washington, D.C., I pointed out that the claim that the cyanamide process required less power than the arc process was a complete fallacy. If a comparison on a power basis is to be made, then *all* the various kinds of power for *all* the various parts of the process, including mining and transport of raw materials, etc., must be taken into account. If a full comparison is made of all methods it will probably be found that the arc process uses less power than any other, the main difference being that with the arc process practically all the power is measured electrically, whereas in the other processes power is used in so many and in such various ways that it is not conveniently measurable.

The authors are very keen about research methods, and when writing of the development of synthetic ammonia they say: "Although many experimenters have studied the problem of ammonia synthesis since the work of Regnault in 1840, success was not attained until Professor Nernst and Dr. Jost, and a little later Professor Haber and Dr. Le Rossignol, all working in Germany, tried the effect of increased pressure. This very soon led, in about 1905, to a workable process. It is noteworthy that all these investigators were *academic* chemists, and the researches were not at first undertaken with any idea of commercial application. Nearly all important commercial chemical discoveries have been made in this way." The authors state that nearly every case of great technical advancement has been made by men who had little or no concern with commerce, and that an important means of technical advance is by developing old inventions and pieces of research in the light of later knowledge..

The description of the cyanamide process occupies 43 pages, and the arc process 35 pages, but most of the very fine plates in the book show portions of arc plants in Norway. The Nitrum arc process is described, and the following quotation shows that it is on lines I suggested many years ago: "The gases supplied to the furnaces are dried by refrigeration before being acted upon by the electric arc. The nitrogen is obtained from the air, and is enriched with oxygen to maintain an average concentration of 50 per cent. The gases are circulated throughout the plant in an enclosed system, and only sufficient fresh oxygen is added to replace that consumed in the formation of nitrogen dioxide and nitric acid. A portion of the gas, however, is vented from time to time to prevent the accumulation of argon, and the oxygen content is allowed to rise to about 50 per cent. About one cubic metre of mixed gas is supplied per hour for each kilowatt capacity of the individual furnaces."

Particulars are given of the new method of freezing out the nitrous gases, and there is a description of the Schloesing process by absorbing the gases, which, by the way, the Norwegian Hydro Electric Nitrogen Co. has tried and abandoned. The last 60 pages deal with oxidation of ammonia, and there are plates showing the catalyst developed by the Munitions Inventions Department. E. KILBURN SCOTT.

THE CHEMICAL TECHNOLOGY OF OILS, FATS AND WAXES. Vol. III. By Dr. J. LEWKOWITSCH. Revised by G. WARBURTON. 1923. 6th edition. London: Macmillan and Co. Pp. 508. 36s.

The new edition of Lewkowitsch's well-known works presents no new features of importance. The increase of 20 pages over the 5th edition is largely due to the extension of the statistics of production and imports and exports of various countries to include the year 1921. The text has been supplemented by references to the more important work published since 1915 (the date of the 5th edition). The present volume deals with products manufactured from oils, fats, and waxes, and the methods of chemical examination, especially designed for the needs of the particular industry under discussion. It contains an index to the three volumes, and a short appendix with supplementary data to the whole treatise. The main industries dealt with are soap, candles, and glycerine (nearly half the volume), hydrogenated fats, paint oils, lubricants, and edible oils. Taken in conjunction with the two preceding volumes, it gives the chemist a very complete account of the practical chemistry of this branch of technology.

HEDLEY BARRY.

THE STRUCTURE OF ATOMS. By ALFRED STOCK. Translated by S. Sugden. 1923. London: Methuen and Co., Ltd. Pp. 86. 6s.

This book of some 80 pages is based on lectures delivered by the author to the chemists of Messrs. F. Bayer and Co.'s Dyeworks at Leverkusen, and translated by Mr. S. Sugden of Birkbeck College. Unlike many translations this one forms an eminently readable book suitable for the ordinary reader interested in atomic theory. It consists of a simple self-contained account of the development of the present theory of the nature of the atom from Dalton to Aston, due stress being laid on the experimental side of the evidence, especially in the more recent work, which is approached from different aspects. Mathematics are duly subordinated, for which the general reader will be thankful, there being no mathematical equations, and only a few necessary symbols used throughout the book. Nevertheless, the book is of value to the student as well as the ordinary reader, and forms a concise summary of the subject.

A FIRST BOOK IN CHEMISTRY. By ROBERT H. BRADBURY. New York: D. Appleton and Co. Pp. 664. 7s. 6d.

This book is intended purely as a school text-book, and the matter contained in it approximately covers the syllabus of English school certificate examinations. The presentation of the matter and the illustrations are above the average. In view of the fact that all through the stress is laid on the practical application of the theoretical facts and argument, the book should be of especial interest to the conscientious teacher, as it seems to fill a gap in English publications between the pure text-book of chemistry and the popularised so-called scientific book, which is often quite valueless to the student. As this is an American edition there are occasional details and expressions which would make it hardly suitable for extended use in this country—*e.g.*, "a millimeter is about the thickness of a dime," although conventional spelling is adopted on the whole, and we are not treated to such monstrosities as "sulfur."

THE CHEMIST'S YEAR BOOK. 1923. Two vols., eighth edition. Edited by F. W. Atack, M.Sc.Tech., D.Sc., F.I.C., assisted by L. Whinyates, A.M.C.T., A.I.C. Manchester: Sherratt and Hughes.

The 1923 edition is the eighth of this well-known handbook and contains concise information on an extremely comprehensive scale for all the chemist's requirements. Alterations from earlier editions are made where necessary and include corrections in the table of "General Properties of Organic Compounds," and revision of the sections on "Portland Cement" by A. Grounds, on "Oils and Fats" and "Dairy Products" by G. D. Elsdon, and on Cellulose and Paper by C. F. Cross. A new section has been added on "Leather Analysis" by W. Mather, A.M.S.T., A.I.C. It may be noted that an American edition is also being published this year for the first time.

OPTICAL METHODS IN CONTROL AND RESEARCH LABORATORIES. By J. N. Goldsmith, Ph.D., M.Sc., F.I.C.; S. Judd Lewis, D.Sc., B.Sc., F.I.C., Ph.C.; F. Twyman, F.Inst.P. Vol. I (second edition). London: Adam Hilger, Ltd., 75A, Camden Road, London, N.W.1. Pp. 56. 1s. 6d.

This book gives a short account of the methods of spectrum analysis (both for normal and absorption spectra), determinations of refractive index and the use of the polarimeter in a form which indicates the value of these optical methods for analysts in all fields of research. Though in so small a book no details are given of the methods, there is a very useful bibliography under each section. There are also useful illustrations of spectra included.

A METHOD FOR THE IDENTIFICATION OF PURE ORGANIC COMPOUNDS. Vol. IV. By S. P. Mulliken, Ph.D. 1922. New York: John Wiley and Sons. London: Chapman and Hall, Ltd. Pp. 210. 30s.

This is the final volume of a series describing the author's method of identifying organic compounds, and deals with compounds containing elements in addition to carbon, hydrogen, oxygen or nitrogen. The previous volumes were published prior to 1914 and deal with compounds containing only the four above-mentioned elements. The system is sound and complete, and should enable any unknown compound in a pure state to be identified rapidly and accurately.

INORGANIC CHEMISTRY. By G. S. NEWTH. 1923. London: Longmans Green and Co. Pp. 772. 8s.

A new edition of this well-known and old-established text-book has just been issued. The book itself needs no recommendation; it is too widely known and appreciated by students all over the country. We note that a clear and brief account of the facts as far as they are established in connection with isotopic elements has been added to the final chapter on radio-activity, together with additional diagrams and tables in this section. It is unfortunate that matters in this direction are moving so rapidly that the material included is already slightly out of date.

ORGANIC SYNTHESES. Volume II. Editor: J. B. CONANT (U.S.A.). London: Chapman and Hall, Ltd. Pp. 100. 7s. 6d.

This is the second volume of a series describing sound methods of preparing such organic compounds in the research laboratory as are not always readily obtainable from dealers. A wide range is included, a random selection being: Benzoyl benzoate, mesitylene hydrazine sulphate, quinone, phthalimide. The research chemist will appreciate its utility.

OUTLINES OF THEORETICAL CHEMISTRY. FREDERICK GETMAN. 1923. London: Chapman and Hall, Ltd. Pp. 626. 18s. 6d.

This is a text-book of Physical Chemistry for the student, consisting of some 600 pages, illustrated with diagrams, originally published in New York in 1913. The present edition is the third, revised and brought up to date in view of the recent discoveries in atomic structure.

RICHTER'S ORGANIC CHEMISTRY. Volume III. Heterocyclic Compounds. English Translation. 1923. London: Kegan Paul, Trench, Trubner and Co., Ltd. Pp. 326. 25s.

The organic chemist will welcome the appearance of the English translation of this well-known work of reference. The value of this book is so well known to the specialist that it needs no further recommendation, and the publication of the final volume increases the value of the series.

Spanish Dyestuffs

THE manufacture of colouring matters in Spain not developing as might be wished, and the Spanish industries being still obliged, according to report, to have recourse on a large scale to foreign countries for their supply of these articles, the possibility is mentioned of certain German dye manufacturing concerns setting up works in the Peninsula.

Chemical Trade and Industry Abroad

In the following sections will be found a selection of some of the possible openings for chemical exports with an indication of the products needed and also of those produced in the countries mentioned.

Possibilities of Australian Trade

A British Preferential Tariff

AUSTRALIA offers many advantages to the British trader—a generous British Preferential Tariff, a strong sentiment in favour of British goods and trading methods, a strong progressive banking system, freedom from anxiety as regards credits, no exchange problems such as exist in India and certain foreign countries, and, not least, a market which must expand with a greater or less degree of rapidity depending on the success of the immigration schemes in operation or to be introduced.

Nevertheless the chemical trader may find the market restricted in some side lines, as the manufacture of certain products is increasing and an Institute of Science and Industry has been formed in Australia with a view to the development of natural resources and the investigation of local problems. Since the appointment in 1921 of Mr. G. H. Knibbs, C.M.G., late Commonwealth Statistician, as Director of the Institute, a definite scheme of work and organisation has been prepared. The scheme provides for the creation of (*a*) a Bureau of Agriculture, (*b*) a Bureau of Industries, and (*c*) a Bureau of Information. Valuable progress has been made in various investigations, of which the following may be specially mentioned :— (1) Biological control of prickly pear pest by means of insect and fungoid parasites ; (2) manufacture of white pottery from Australian raw materials ; (3) utilisation of Australian trees for manufacture of paper-pulp ; (4) utilisation of new tanning materials ; (5) power-alcohol ; (6) blow-fly pest.

Import of Chemicals

It is satisfactory to note that Germany is not, as yet at any rate, a serious competitor in the chemical trade of Australia, even in fine chemicals and dyes. The total imports of chemicals, fertilisers and drugs in 1920-21 were valued at £5,587,575. Items of interest were : tartaric acid, £294,577, of which £271,229 came from the United Kingdom ; cream of tartar, 1,356 tons, valued at £415,526, of which 373 tons, valued at £99,629, came from the United Kingdom, 615 tons, valued at £217,339, came from France, and 236 tons, valued at £52,854, from the United States. Cream of tartar substitutes make but little headway in Australia. Imports of synthetic dyes in 1920-21 were as follows :—

	£
United Kingdom	282,283
Germany	37,018
Switzerland	75,277
United States	17,246
All Countries	412,841

Explosives

During the war the Australian Explosives and Chemica Company (one of the merger companies of Nobel Industries Ltd.) extended its factory at Deer Park, near Melbourne, to a capacity of 2,500 tons of gelatinous explosives. Proposals to enlarge the factory still further, to provide for the production of the whole of Australia's requirements of high explosives, black powder, detonators, etc., were made in 1920, but, owing to the financial depression which supervened, negotiations in this direction were suspended.

Explosives is one of the few items, if not the only item, on which the import duty has not been increased, and as the raw materials which have to be imported are subject to duty the local industry is severely handicapped, particularly in competition with South Africa, whence the majority of Australia's explosives are imported.

Cement, Paints, and Varnishes

The existing cement works are capable of supplying the whole of Australia's requirements. In addition, one new works is under construction and two new works proposed. The imports of cement in 1920-21 amounted to 26,731 tons, valued at £208,649, and in 1921-22 to 24,166 tons, valued at £98,768. The great decrease in value per ton will be noted. In the former year £35,137 came from the United Kingdom, £43,299 from Denmark and £81,581 from Japan.

Both paints and varnishes are now made locally on a sufficiently large scale to meet all Australian requirements. Imports are still coming in, but the trade is likely to be a diminishing one.

The white lead factory at Cabarita, near Sydney, established by the British Australian Lead Manufacturers Proprietary, Ltd., commenced deliveries in August, 1921, and is now in full and successful operation.

Trade Openings in China

THE industrial development of China opens for the manufacturer a wide and increasing market for both heavy and fine chemicals. The industries at present established include soap making, dyeing, tanning, etc., and these are dependent on imports of chemicals.

Since Great Britain is the largest producer of heavy chemicals in the world, and by reason of her highly efficient production and control of raw material, she is in a position successfully to compete with manufacturers less remote from China. Particularly is this true of soda ash, caustic soda, silicate of soda, sulphate of ammonia, borax and glycerin, the last-named being a by-product of the soap industry, in which connection Great Britain is the largest producer. She is also a very large producer of bleaching powder. Japan also produces bleaching powder, of which China takes a fair quantity. The development of the textile industry in China offers a field for bleaching powder to which British manufacturers should give the closest attention.

Industrial Development

A noteworthy feature of the industrial development of China is the progress in manufacturing in all the leading provinces. A few years ago the manufacture of articles hitherto imported was confined to a limited number of the Treaty Ports. But the economic side of the subject has been carefully studied by the Chinese, and works are now erected in places affording the greatest facilities for the lowest cost of production. The conservatism of the Chinese is breaking down, and Western methods are displacing native processes. This is making the road for the foreign manufacturer easier, and he can now undertake propaganda which is more likely to prove profitable than it would have been a few years ago.

China being essentially an agricultural country on an intensive scale, it offers an enormous field for fertilisers. The chief obstacle to this development, the conservatism of the farming class, will be broken down by organised propaganda, as is already being done in South China. Once the Chinese are convinced that the employment of an imported fertiliser increases their crops, their present crude methods of fertilisation will be wholly or partly abandoned. It is anticipated that it will not be many years before China has several agricultural colleges, for her expanding population, and competition, will force her to obtain the utmost return from her soil.

The Fine Chemical Trade

Germany and other countries take an increasing interest in China's demand for chemicals and dyes ; and British manufacturers will only maintain their pre-eminent position by keeping in the closest touch with the Chinese and by propaganda of a highly practical character.

The question of old-established " chops " (or trade marks) is still an asset of considerable value ; but an admission of the breaking down of conversatism must carry a warning that old-

established marks will only avail provided other things are equal. Thus price, distribution and representation must all play their part as an effective and necessary backing.

Prior to the war the United Kingdom was not very greatly interested in the fine chemical trade. The war, however, called for greater activity, and British manufacturers proved that they could not only produce as economically as other countries but frequently produced superior qualities.

Germany has been, and will always be, a strong competitor. Her position is largely the outcome of trade combination, and no effort should be spared to develop the excellent trade combination amongst British manufacturers, without which British trade will be seriously handicapped in foreign markets, particularly in China. With the already long-established British firms in China, which have developed distribution to an extent and on a scale unapproachable by any other nation, it should be possible to effect working arrangements which will permit effective distribution on an economical basis which will largely make for success. British quality is a foundational asset upon which British manufacturers can build a strong and permanent structure, but there must be the closest combination between the manufacturer at home and distributing firms in this country.

The Position of Dyes

As regards dyes the position is, perhaps, not quite so clear, although still capable of definition. China has long ago ceased to be satisfied with " native " or " vegetable " dyes, and has become almost entirely dependent on the imported synthetic article for colouring large quantities of silk, cotton, paper, etc., consumed in all parts of the country. Foreign dyes are sold in very large quantities in all the main provinces, and are to be found in practically every town and village throughout the country.

Before the war Germany almost held the monopoly of the dyestuff trade of China, the only other serious competitors being the Swiss. With the advent of the war, Great Britain, France, Japan and the United State of America established, or greatly extended, the manufacture of dyes ; and the curtailment, and finally the cessation, of Germany exports enabled them to enter seriously into the China business.

From 1915 to 1919 Japan and America were in a particularly favourable position in China. During these years Great Britain was fully employed in supplying the enormous demands of the home and Allied dye consumers, and was able to enter the China market seriously only towards the close of 1919.

The high development reached in both by Continental dye manufacturers made it certain that they would again become strong competitors after the war, and the period since the close of the war has been a severe testing time for those countries which had newly entered into the China market. Some of these manufacturers have dropped out of the race, defeated either by inefficiency, resulting from lack of experience, or by inadequate financial resources. Others, including a number of British manufacturers, have stood the test and demonstrated their ability to hold their place in the world's dyestuff trade. As far as Great Britain is concerned, the quality of British dyes is in no way inferior to corresponding German products, and there are no dyes of importance in the China market that are not being manufactured in England to-day.

The prestige resulting from many years of successful trading in China and the valuable goodwill attached to old-established " chops," gave the firm conclusion that Germany would resume an important place in the dye trade of China as soon as she was allowed access to the world's markets. Such actually happened, and it is to be remembered that in her strenuous endeavours to regain her former position she has been enormously assisted by her depreciated currency. German hopes of eliminating her competitors, however, have not been fulfilled. Steady progress has been, and is being, made in China by British dye interests ; and it is now beyond question that, as world conditions alter in her favour, as they are now doing, Great Britain will not only hold but will consolidate and extend the position which she had won in the China market.

Statistics of the Chemical Trade

The following figures show the imports into China for the years 1913, 1919, 1921, from various sources :—

CHEMICAL PRODUCTS (NOT INCLUDING MATCH-MAKING MATERIALS, MEDICINES AND SODA). (*Value in Haikuan Taels.*)

	1913.	1919.	1921.
Great Britain	78,913	164,798	307,574
Germany	90,565	—	102,250
France	8,737	3,398	6,641
Switzerland	—	—	1,842
Japan	172,459	844,998	1,343,844
U.S.A.	40,160	272,718	427,546
Total gross imports	493,575	1,632,761	2,848,789

GLYCERIN. (*Quantities in Piculs.*)

	1913.	1919.	1921.
Great Britain	21,844	30,023	16,821
Germany	109,348	—	400
France	—	—	—
Japan	2,277	19,227	56,462
U.S.A.	—	17,220	7,769
Total gross imports	136,164	79,190	93,900

SODA. (*Quantities in Piculs.*)

	1913.	1919.	1921.
Great Britain	914,399	1,725,717	1,041,988
Germany	6,482	—	15,376
France	19	86	416
Japan	22,452	622,469	510,590
U.S.A.	4,429	612,073	12,516
Total gross imports	1,132,803	3,336,095	1,855,404

ANILINE DYES. (*Value in Haikuan Taels*).

	1913.	1919.	1921.
Great Britain	261,816	37,008	250,703
Germany	2,187,251	—	3,390,278
France	65,150	316,268	9,687
Japan	15,744	824,206	699,936
U.S.A.	656	1,667,691	634,249
Total gross imports	5,427,345	3,272,231	8,521,576

ARTIFICIAL INDIGO. (*Value.*)

	1913.	1919.	1921.
Great Britain	8,433	128,205	1,934,448
Germany	3,502,744	—	1,857,124
France	579,991	643,905	3,535,600
Japan	365	153,421	14,387
U.S.A.	—	341,365	2,617,177
Total gross imports	9,641,283	1,315,773	15,533,029

UNCLASSED DYESTUFFS. (*Value.*)

	1913.	1919.	1921.
Great Britain	8,332	21,202	21,065
Germany	232,253	—	130,768
France	121,628	12,731	66,407
Japan	38,681	666,760	1,072,757
U.S.A.	2,049	87,326	76,565
Total gross imports	959,327	1,266,200	2,230,668

Japan's Chemical Trade

Japan is a considerable trader in chemicals, both export and import ; and though producing fine chemicals, etc., in some quantity, the scope for the importer is considerable, as will be seen from a perusal of the figures. The import of caustic soda and soda ash for the first eleven months last year reached the total of 1,829,361 piculs, valued at Yen 8,654,426, against 674,666 piculs, valued at Yen 2,932,750, for the same period in 1921, and 1,438,376 piculs, valued at Yen 11,449,315, in 1920. Particulars are as follows :—

	Picul.	Yen.
Great Britain	1,305,125	6,189,112
United States	111,659	1,293,981
African Countries	412,254	1,169,352
Other countries	323	1,981

Japan imported sulphate of ammonia to the total of 1,477,011 piculs, valued at Yen 11,842,828, for the first eleven months last year from the following countries :—

	Picul.	Yen.
Kwantung Province	15,637	140,923
Great Britain	36,114	307,164
United States	1,292,449	10,542,596
Australia	16,745	161,842
Other countries	86,068	690,303

In comparison with that of 1921 and 1920, the total import of last year increased 37,876 piculs, valued at Yen 3,786,244, and 752,831 piculs, valued at Yen 8,006,344, respectively.

Demand for Fertilisers

The demand for chemical fertilisers in Korea has been steadily increasing with the development of agricultural industry. The consumption of fertilisers in Korea in 1920 amounted to Yen 6,000,000 in value, but in 1922 it totalled Yen 8,000,000, and it is estimated that in 1923 the amount will reach Yen 10,000,000. Of the various chemical fertilisers, sulphate ammonia is most in demand in the Peninsula. In Keido province, for instance, the demand for sulphate of ammonia in 1922 totalled 900 tons, and it is expected that the consumption in the provinces in 1923 will reach 1,500 tons.

The import of fertilisers into Japan during November amounted to 90,192 tons, valued at Yen 7,166,852, showing an increase of 12,453 tons in quantity and of Yen 651,847 in value. Some particulars of the November import are as follows :— Sulphate of soda, 6,336 tons ; sulphate of potash, 696 tons ; sulphate of ammonia, 4,861 tons ; phosphate rock, 2,401 tons.

Import of German Goods

That the Germans are making strenuous efforts to recover the commercial hold in the Far East which she had lost during the war is a well known fact, and this can be seen when the increasing amount of German goods imported to Japan is taken into account, as shown below :—

	1921. Yen.	1922 to Nov. Yen.
Total import from Germany	47,744,000	102,259,000
Drugs and chemicals	4,593,000	10,207,000
Coal-tar dyes	14,256,000	13,611,000

Germany imports of dyes are far greater than the British at present ; and the latter are in an unfavourable position, as will be seen from the quantities imported :—From Great Britain, 29,900 kin ; France, 53,948 kin ; Germany, 5,673,971 kin ; Switzerland, 109,173 kin ; United States, 539,837 kin ; other countries, 17,157 kin.

Camphor Export

Camphor is one of Japan's principal chemical exports, and the figures for the eleven months ended November 30 last year are 32,156 piculs, valued at Yen 6,364,943, in comparison with 11,237 piculs, valued at Yen 2,117,694, and 10,003 piculs, valued at Yen 4,869,716, for the same interval in 1921 and 1920 respectively. The destination of the same last year is classified as below :—

	Picul.	Yen.
British India	3,252	663,296
Great Britain	3,972	765,960
France	1,791	343,867
United States	19,585	3,871,933
Australia	762	170,107
Other countries	2,794	549,780

Protection of the Dye Industry

During the war boom a large number of dye-making concerns were started, and the annual output of dyes amounted to 30,000,000 to 40,000,000 kin while the industry was at the height of prosperity. Since the termination of the war many of these dye manufacturers have been unable to stand the competition of foreign rivals, and only a few concerns are at present turning out about 10,000,000 kin of sulphur, aniline and other dyes. The Japanese dye manufacturers have been asking the Government to adopt a system of allowing the import of dyes by means of special permit so that the domestic industry may be protected. Whether the Government will accede to the demand of the manufacturers, however, remains to be seen.

Apart from this phase of the question, the Japanese Government has been spending a large amount of money for the protection of the dye industry. When the Japan Dye Manufacturing Co. was established in 1916 the Government concluded a contract with the concern thereby guaranteeing the payment of 6 per cent. interest on the capital invested, and also making good any amount of loss that may be incurred during six years. As the losses of the company have been growing, the outlay of the Government in the payment of interest and in filling up the losses has been very great. Under these circumstances, opinions are expressed in many quarters that on the expiry of the existing contract at the end of 1925 it should be terminated, but it seems to be the intention of the authorities to continue the protection of the industry in some modified form or other.

Production of Glycerin

Japan and the Philippines are the only countries of Far Eastern Asia producing glycerin in sufficient quantities to give the trade any importance. Until the outbreak of the war all glycerin used in Japan was imported from the United States and Europe, but since then progress has been made in Japan, and the volume of imports of this commodity has been reduced. The glycerin manufacturers in Japan originally used fish oil, but they are now adding to the supply with tallow, vegetable wax, and coconut and bean oils. In the Philippines the glycerin produced is largely a by-product of the soap factories, and the original material used is chiefly coconut oil. As in the case of Japan, the industry is not yet developed to a sufficient extent to supply the domestic demand, and exports are made only under unusual conditions.

Chemical Requirements of Poland

DURING the war the occupation authorities aimed at the destruction of what remained of the Polish chemical industry. On regaining her independence Poland found herself in dire need of dyes and drugs. Her highly developed textile industry required large quantities of dye stuffs and intermediate products, and to combat the maladies reigning in Poland as a consequence of the privations which the population had suffered, the need of medicaments was great.

The Need for Dyes

Polish factories are in immediate need of intermediate products sufficient for the production of 2,500 tons of dyestuffs. Poland needs :

a. Prepared dyestuffs, which would enable the textile industry to be put in full working order.

b. Chemical and pharmaceutical products, the want of which is greatly felt throughout Poland, particularly in the eastern territories.

c. A number of intermediate products necessary for restoration of Polish industry (coal-tar products) which were either destroyed or requisitioned by the German authorities.

The list of yearly dye requirements of United Poland which follows was drawn up by the Union of Polish Manufacturers :—

	Cotton Dyestuffs	Tons
1.	Direct dyes	1,970
2.	Sulphur Dyes	820
3.	Basic dyes	66
4.	Vat dyes	130
	Total	2,986
	Cotton and Wool Dyestuffs	
1.	Direct dyes	526
	Wool Dyestuffs	
1.	Vat dyes	250
2.	Acid dyes	1,100
	Total	1,876

Total amount of dyestuffs required by Poland is 4,862 tons.

German Supply Mortgaged

The purchase of these commodities at present rates of exchange presents great difficulties. Moreover, Germany, which seems to have the only exportable surplus in Europe, is on principle unwilling to supply Poland, owing to her obligation to sell dyes to the Entente Powers, according to the economic claims of the Treaty of Versailles.

If the Germans are allowed to regain their former control of the Polish market it would be a difficult matter to oust them. It is a simpler matter to forestall them by securing a firm hold on the Polish market during the next few years.

Chemical Products Needed

On a normal basis the Polish textile industry requires in addition to the principal dyes, the following chemical products :

	Tons
Bleaching Powder	1,000
Bisulphate of Soda (calcined)	7,500
Caustic Soda	6,000
Carbonate of Soda (calcined)	3,500
Acetate of Soda	200
Bichromate of Potash or of Soda	600
Ferrocyanide of Potash or of Soda	100
Chlorate of Potash or of Soda	60
Chromium Acetate (dry)	20
Nitrate of Soda	50
Double Salt of Antimony	50
Chrome Alum	250
Alum of Sulphate of Aluminium	200
Hydrosulphite (for printing)	10
Bisulphite of Soda (dry)	200
Bisulphite of Potash	500
Copper Sulphate	60
Sulphuric Acid	6,000
Hydrochloric Acid	2,000
Nitric Acid	50
Acetic Acid	1,100
Yellow Glycerin	40
White Glycerin	100
Aniline Salt	200
Quercitron Extract	100
Aniline Oil	20
Paranitraniline	100
Beta Naphthol	100
Alpha Naphthylamine	30
Sodium Sulphide	3,200
Sulphur	1,000

Czecho-Slovakia

Demand for British Chemicals

THE Acting Commercial Secretary at Prague reports to the Department of Overseas Trade that the French occupation of the Ruhr district and the present industrial situation in Germany are undoubtedly having their effect on the local market, but the increased demand arising out of the abnormal conditions obtaining in Germany has, as yet, scarcely been noticeable owing to the fact that the stocks in hand in this country have been sufficiently large to cover all requirements. In view of the general depression in the textile industry, even the demand for aniline dyes has been almost imperceptible, yet in normal times the Czecho-Slovak requirements in dyes were so large as to be an item of great importance even to the largest German works. The present stocks, however, will not last for any great length of time, and there is no doubt that sooner or later there will be a shortage of aniline dyes and higher prices will be seen, especially as German prices have now practically attained the level of those ruling in the international market. The effect of the occupation of the Ruhr on the Czecho-Slovak heavy chemical trade has been to arrest the falling tendency of prices.

Lower prices were expected for acetic acid, soda, borax, and chloride of lime, but in view of the temporary alienation of German competition no reduction whatever has taken place, and local prices are still two or three times higher than German prices, and often higher than those ruling in the Western States.

Following are the market prices of chemicals per kilo ruling in Prague on March 8 :—

	Czech Crowns.
Acetone	21.0
Alum	4.35
Formic acid (80 per cent.)	12.30
Benzoic acid	38.0
Sulphate of magnesia	1.40
Borax crystals	6.50
Boric acid	11.0
Chloride of barium	3.20
Chloride of (chlorinated) lime	2.60
Chloride of potassium	10.0
Chrome alum	7.0
Dextrin	3.0
Green vitriol or copperas	0.60
Acetic acid (80 per cent.)	18.0
Yellow cyanide of potassium	30.0
Sulphate of soda (powder)	0.90
Sulphate of soda (crystals)	0.80
Permanganate of potash	15.0
Nitrate of potassium	7.0
Oxalate of potassium	19.0
Blue vitriol	8.0
Lime	8.0
Oxalic acid	13.0
Paraffin	3.50
Sal volatile (98-100)	5.90
Liquid ammonia (0·910)	5.30
Nitric acid (36°)	3.0
Hydrochloric acid (20-22 per cent.)	0.95
Shellac T.N. orange	64.0
Sulphide of sodium	3.80
Sulphide in pieces	1.80
Sulphuric acid (66 per cent.)	1.25
Tartaric acid	25.0
Turpentine (French)	19.50
White vitriol	2.80
Japan wax	12.50
Carnauba wax	16.0

The present approximate rate of exchange of the Czech crown is 158 Cr. = £1.

General Conditions of Italian Trade

The Mussolini Regime

AT the end of 1921 the central fact dominating the commercial as well as the political situation in Italy was the accession to power of Signor Mussolini as head of the Fascist Government. A Government cannot create trade, but it can provide the conditions under which trade will prosper, and a widespread feeling of confidence is already showing itself, and a new impetus is being given to movements already initiated, and forces already existing have greater freedom to expand.

The record of achievement throughout last year is not discouraging. The movement of trade is in the right direction and the adverse balance, though still serious, is again less than in the preceding year. Some industries, notably shipbuilding and metal works, are passing through a crisis, and their future is not clear. Others, including the important cotton and wool industries, and a group of minor industries, are in a satisfactory condition. and the country is producing for itself many articles which previously were imported. The improvement in the labour situation is almost startling compared to the position as it existed at the end of 1920. From the point of view of British trade, there are grounds for considering the outlook more hopeful than it was twelve months ago.

The Report to the Department of Overseas Trade of Mr. J. H. Henderson and of Mr. H. C. A. Carpenter, Commercial Secretaries to H.M. Embassy at Rome, analyses at some length the financial situation of Italy. They observe that the Minister of the Treasury stated in the Senate on November 26 that the estimates received from the various departments showed a total income of 17,750 million lire and an expenditure of 22,276 million, making an estimated deficit for 1923-24 of 4,526 million lire. A revision of taxation was declared to be necessary, but the fundamental principle would always be kept in mind that the new imposts would be balanced by corresponding economies in such a way that no heavier burden would be laid on the nation. The Government would be very cautious in introducing new taxes, believing that it was better to encourage industry and so enable it to pay the taxes already existing. The whole system would be simplified by combining separate taxes and altering the method of collection. Anomalies and inequalities would be removed. The Government was opposed to the principle of confiscating private wealth by high taxes, and on this ground intended to reduce the succession duties, which at present amounted in certain cases to as much as 102·75 per cent. of the inheritance. No new taxes have been imposed, and the alterations on existing taxes have, on the whole, been unimportant. The regulations regarding the capital tax have been revised and the changes

include some relief in the case of debts due to the contributor by persons abroad and in the case of businesses carried on by foreign companies in Italy. Reference may also be made to the abolition of the law providing for the compulsory registration of bearer shares. The Government, however, was not able to relinquish the income, said to amount to 40 million lire per annum, derived from the special tax of 15 per cent. on the dividends of bearer shares, which still remains in force.

British Chemical Trade

The following notes in the above-mentioned Report refer to the present condition in the chemical and allied trades. There is a considerable demand for chemical products, such as caustic soda, sulphate of ammonia, sulphate of copper, sulphide of soda, Glauber and antimony salts, and chromium salts, which are imported for agricultural and industrial purposes, the chief competing countries being Belgium, Germany, France, and the United States of America, not to mention Italy herself.

Of second grade paints and colours, Italy produces 75 per cent. of the demand, Germany supplying the remainder. In first-class grades, Great Britain has the most of the trade, the United States of America being the next largest exporter. In dry artificial colours, Germany has practically a monopoly. A certain amount of liquid paint comes from France.

British traders are largely interested in the import of palm oil, tallows, and fats. Crucibles are among other British products for which there is still a certain demand, and scientific glassware of English manufacture is on sale at some of the pharmacies, but local and German competition is strong. Domestic glass comes largely from Bohemia, or is made locally. English glass is stocked by a few firms, but these are chiefly old stocks kept for replacements or small orders. Electrical fittings, insulating cloth, iron alloys for transformers and motors, copper wire, silk and cotton for binding, and insulating varnish, sell in small quantities. German competition is dangerous, but in many cases it has been found that goods do not conform to sample. In electric fittings generally Italy can compete successfully, and in some cases sell as much as 20 per cent. cheaper.

Difficulties and Methods of Trade

The principal obstacles to British trade in Italy are still the exchange and the tariff. With regard to the first of these the difficulty arises less from the high rate than from the fluctuations in the exchange. In some cases traders have tried to obviate the difficulty by selling at a fixed rate, generally between 70 and 80 lire to the pound, and most of the reports which have been received are to the effect that this method has produced good results. There is a prevalent belief that under the new Government the exchange is going to improve materially in the next six months, and this is having the effect of inducing potential buyers to defer their purchases or to insist on a lower maximum rate of exchange. On the other hand, there is a considerable latent demand for British goods, particularly those known on the market before the war, which becomes apparent the moment the exchange shows a tendency to go down. British travellers to-day would find Italians more willing to consider business than they were six months ago, when British goods were recognised as being practically beyond reach, but they must expect to find a tendency to insist on quotations at a rate of exchange lower than the current rate. The Italians are in fact more confident of their position, and with so many pressing for their custom they can afford to impose their own conditions.

A difference of opinion exists as to the extent to which the success or failure of foreign traders in Italy depends on their methods of trade, and according to some observers the difficulties created by the existing situation are such that they cannot be surmounted by any methods of trade. It is also doubtful how far there is justification for the criticisms which are still directed against British trade methods. The most severe of these has been received from a prominent Italian merchant, who says that the principal obstacle to British trade arises out of the want of interest which the British seem to take in Italian affairs; that so long as this state of mind continues all inquiries, encouragements and official support will be of no use and will lead to no practical result; that the products of other countries, not to mention Italian products, will be preferred, because they are made more attractive by skilful travellers, by advertisement, and by all the propaganda work which is wanting, and will continue to be wanting, until British producers are convinced that it is to their interest to take it up. This statement is considered to be too sweeping, but at the same time it must be remembered that for the moment the market in Italy is a buyers' market, and that exporters must study their customers' wishes, or lose the business.

The Packing of Goods for Export

The Importance of Careful Marking

THERE is one matter which, in the opinion of many directly employed in the transport of goods overseas, urgently deserves careful attention on the part of the British exporter. This is the proper marking of cases and packages as distinct from proper packing.

Present faults have become so obvious that commercial centres throughout the world recognise that steps must be taken to remedy them. One phase of the present situation is expressed clearly in a notice which was issued recently to shippers and manufacturers by the Pacific Steam Navigation Co. of Liverpool, which is largely engaged in South American trade. This notice ran as follows :—

Care of Cargo.

" In order to minimise the opportunities of cargo pilferers, shippers are strongly recommended to instruct their suppliers of goods for shipment that no advertisements or lettering relating to the nature of the contents should appear on the outside of packages. The practice of suppliers branding cases, etc., with trade marks, etc. (*e.g.*, those advertising alcoholic liquors, sweetmeats, canned goods, etc.), should be discontinued, as it offers a great temptation to, and is an aid to, pilferers.

Packages containing articles of a fragile nature should, however, be marked, " Fragile, Glassware," or some other appropriate notice, as at present.

Shippers are urged kindly to comply with the foregoing recommendations, and thus co-operate in the special efforts which the company, in the common interest, is making to reduce the opportunities for pilferage and theft of cargo."

It will be seen that this statement indicates advertising of a kind that may be disadvantageous.

Recommendations from Australia

Representations of a similar kind have, according to *The Times* (Trade Supplement), also been made by the Overseas Shipping Representatives' Association, of Melbourne, which has had a number of photographs taken of packages marked in an obviously faulty manner. These photographs show that not only do the suppliers of goods indicate the nature of the contents which may, as the above letter of a shipping company engaged in quite another trade indicates, give would-be pilferers information they should not possess, but that the advertisements are also a hindrance to the stacking and correct delivery of the goods. It seems to be quite a common practice for the names of the suppliers to be stencilled in much larger lettering than the shipping marks of the consignees, and, in some instances, the shipping marks which should be clearly displayed are quite overshadowed or even rendered almost illegible by the description of the contents. The lettering of the shipping marks on some of the cases shown in the photographs is extremely faint, and the marks in some instances are scarcely decipherable in the photographs.

Sometimes the initials of the firm to which the package is consigned are hardly visible, being stencilled over the manufacturer's advertisement. The name of the port is also often not as large as the description of the contents.

The shipping mark and the port should be shown in large type and there should be no advertisement whatever. There should be nothing in the marking to hinder the correct tallying, stacking and delivery of the case, even when work is proceeding in a bad light, such as at night-time. Careful tallying is, it will be remembered, now being largely relied upon by shipping companies for lessening the opportunities of tampering with merchandise in transit. All old marks on bags should be obliterated, as in the case of labels on personal luggage.

As regards crates, it is pointed out that at present a method adopted frequently is to cut the consignee's brand on the side

of each crate, which makes it exceedingly difficult to pick out the lettering when stacking and delivering the crates. The supervisors recommend that a piece of wood should be inserted and fastened securely at each end of the crate with the brand and port mark plainly stencilled on it in 2-in. letters. Generally, it is urged, properly mixed paint should be freely used for the consignees' port marks, although not for advertising the names of the suppliers of the goods and the character of the contents.

Canadian Railways' Action

The Manchester Association of Importers and Exporters discussed, at a council meeting last summer, a statement bearing on the subject from the Canadian National Railways, the Canadian Pacific Railway Co., and the Grand Trunk Railway System. These railways pointed out in the statement that "it is of the utmost importance that packages be distinctly marked before shipment with the consignee's name, destination and province. When packages 'bear blind or abbreviated marking' they are to be marked by label, tag or stencil by an employee of the carriers. The charge for such marking is to be fifteen cents for each package or piece of freight so marked, and this charge, unless paid to the carrier or his agent, is to follow as an advance charge against the shipment." While, the railway companies continue, the printing of the consignee's full name and address would obviate any risk of delay in delivery, this, it is appreciated, is not always practicable for various reasons. If, however, shippers will have the goods marked with the initials of the firm and then underneath the names of the city or town and the province, all the necessary requirements for the transport of the goods ex-shipped at the port of discharge to the interior port in Canada would be met.

The Department of Overseas Trade

The Scope of its Work

In this country, being dependent for its prosperity on its export trade, the existence of the Government Department of Overseas Trade, 35 Old Queen Street, Westminster, is an official recognition of this fundamental fact which is of very great value to the manufacturer. As is now fairly well known, the main idea of the Department is to put the British producing firm in touch with potential markets for his goods overseas, a matter which is obviously too great for individual firms. The trader may make use of the Department in the following ways:—

1. By obtaining from the Department's overseas officers in all parts of the world commercial information likely to be of interest to British manufacturers and traders and by distributing it confidentially, when this is desirable, or through the medium of the Press. The information so distributed relates, amongst other matters, to—

(*a*) Contracts open to tender: (*b*) overseas demand for particular goods: (*c*) lists of importers of various goods in overseas markets: (*d*) suitable agents for British manufacturers and merchants: (*e*) best methods of marketing and distribution; credit conditions; terms of payment; nature of competition, and the best way of combating it: (*f*) customs tariffs and regulations; regulations governing commercial travellers; registration of trade marks; Consular invoices, etc.: (*g*) statistics of imports and exports: (*h*) shipping and transport: (*i*) manufacturers of any specified goods in the United Kingdom: (*j*) sources of supply of raw materials and of goods not manufactured in the United Kingdom.

2. By the issue of annual reports dealing with the industrial, commercial and economic conditions prevailing in overseas markets.

3. By organising trade fairs with the object of attracting important overseas buyers and bringing them into touch with the British producer.

4. By arranging exhibitions of foreign goods and catalogues for the guidance of British manufacturers who may be able to produce competitive articles.

Export Credits

In addition to the supply of commercial information, the Department of Overseas Trade is in a position, through its branch, the Export Credits Department, to render assistance to the exporter in financing his trade.

At the moment only India, Ceylon, the Straits Settlements, where banking facilities are inadequate for the trade to be done, and Russia, are excluded from the scheme. Credits will be given for small as well as large sums; but Parliament has prescribed that the total credits at any time must not exceed £26,000,000. A small commission is charged, and credits are given on two systems: (*a*) In respect of specific transactions; (*b*) credits which do not involve reference to the Department for each transaction.

Overseas Organisation

To enable it to be of the greatest value to overseas trade, the Department is served by an efficient network of representatives throughout the world, who maintain a constant supply of information to the home centre and provide local assistance in the promotion of British trade. The Department has control of the following services for this purpose:—

1. The Trade Commissioner and Imperial Trade Correspondent Services in the Empire.

2. The Commercial Diplomatic Service forming part of the British Diplomatic Missions in foreign countries.

3. The British Consular Service in foreign countries.

In the Empire there are 11 Trade Commissioners at work, covering Canada, Australia, New Zealand, South Africa, Newfoundland, India, Ceylon, East Africa, and the British West Indies. The Trade Commissioners have the assistance of Imperial Trade correspondents at a few of the most important centres, and the Department also has the services of correspondents in parts of the Empire in which at present there is no Trade Commissioner.

Besides supplying information for distribution in this country, the Department's officers abroad are able to give a great deal of assistance of a positive kind. It is their business to maintain good relations with the Government authorities and with the commercial community in their areas; and the Department is constantly receiving evidence of cases in which its officers have been able to remove the difficulties or facilitate the business of British traders.

The overseas officers of the Department are kept constantly posted by the Department of Overseas Trade, through the issue of regular bulletins, on all commercial and industrial developments of importance at home; and it has been found useful to bring overseas officers home periodically and arrange for them to visit the principal industrial centres of the United Kingdom and familiarise themselves generally with the methods and products of British manufacturers.

Distribution of Information

In addition to answering specific inquiries, the Department distributes a considerable amount of general information in the *Board of Trade Journal*, the Press, and trade journals. A considerable amount of information received, however, by the Department is of a confidential nature or is of such value that it should be not allowed to become available to foreign competitors. It is therefore undesirable to give it general publicity. For the distribution of such intelligence there are two channels, the first known as the Special Register, and the second as Form "K." Further particulars of these services can be obtained from the Department.

Finally, it may be pointed out to those who are not well acquainted with the work of the Department that it is essentially the business department of the Government, and is continually rendering valuable services to the business community.

Notes on Fertilisers

A LEAFLET may be obtained from Mr. G. A. Cowie, M.A., B.Sc., F.I.C., of 39, Victoria Street, London, S.W.1, free of charge, descriptive of the right use of fertilisers for growing lucerne, which is particularly valuable owing to the sensitiveness of this crop to fertilisers and soil conditions. An illustrated pamphlet on "The Economic Manuring of Potatoes," is also published by Mr. Cowie, which gives statistics and important advice as to the specific importance of potash dressings in the production of saleable-sized tubers, as proved by official experiments carried out last year. Points worthy of note in the pamphlet show that potash is the dominant ingredient for potatoes; that many compound potato manures contain too little potash; and that sulphate of potash is the best form of potash for potatoes. Copies of both pamphlets can be obtained gratis upon application to Mr. Cowie at the above address.

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Catalogues Received

GASTON, LTD.—Information on many essential points about concrete machinery is supplied in a folder issued by Gaston, Ltd., Acton Vale, London, manufacturers of the "Rex" concrete mixers. Photographs of several types in the "Rex" range are included, with brief specifications.

THE COUNTY CHEMICAL CO., LTD., Birmingham.—This firm has commenced the issue of an advertising monthly newssheet entitled *The Better Times*, the first of which has reached us. This clearly sets forth the firm's specialities in the form of carbide, polishes, lubricants, rubber solution, etc.

THE POWER-GAS CORPORATION, LTD., Stockton-on-Tees.—This firm, operating the Mond and Lymn patents, forwards an illustrative leaflet of its specialities in gas-producer plants of various types, meters, benzol recovery and refining plants for coal gas, and gas washing and cleaning apparatus.

GLASGOW ELECTRICAL ENGINEERING CO., LTD.—This firm, of 45–47, Pitt Street, Glasgow, forwards a descriptive booklet describing small practical wind-driven electric power installations, obviously applicable for country laboratories or small works requiring occasional electric power at small outlay.

BRITTAIN'S ELECTRIC MOTOR CO.—A useful catalogue and literature giving descriptions of various types of electric motors—single phase, polyphase, slip ring, generator sets and the like—containing useful particulars and dimensions of each, will be forwarded on application to the firm at 110, Cannon Street, E.C.4.

LIONEL ROBINSON AND CO.—This firm is circulating from their office, 3, Staple Inn, London, W.C.1, a card advertising the prices and particulars of their "Ballsok Beads," which are used for insulating electrical wires at temperatures up to 1200° C. The value of these will be apparent to the electrochemical manufacturer.

JENKINS BROTHERS, Bridgeport, Conn., U.S.A.—This firm's agents, Fredk. E. Potter, Ltd., Imperial House, Kingsway, W.C.2, forward an interesting leaflet descriptive of a new efficient easily manipulated rapid-acting water-valve suitable for use in connection with many kinds of chemical industrial apparatus where quickly controlled flow of liquids is required.

J. H. SANKEY AND SONS, LTD.—A booklet descriptive of "Pyruma" cements is issued by this firm from Essex Wharf, Canning Town, E.16. These cements have advantages over fire-clay for furnace linings, particularly as regards durability and ease in carrying out repairs. They are obviously applicable in many chemical works, glass works, varnish manufactories, and the like.

GRIFFITHS BROS. AND CO.—A useful paint and varnish pot for the bench, sent by Griffiths Bros. and Co., London, is designed to exclude dust, to prevent the absorption of moisture from the air, and to avoid thickening through the evaporation of thinning liquids. The brush and lid are in one piece, and when the brush is returned to the pot, the latter is automatically closed, and the brush remains clean and moist for future use.

ELECTRO BLEACH AND BY-PRODUCTS, LTD., Middlewich, Cheshire.—An excellent booklet pointing out the value of applying lime to agricultural land as a general aid to good production is issued by this firm, special stress being laid on the now generally accepted fact that the best form to apply the lime is combined as carbonate, of good quality, the firm supplying a carefully graded product of this class under the name "Electrolime."

THOS. BROADBENT AND SONS, LTD.—This firm forwards a descriptive booklet dealing with automatic centrifugal clutches for use with electric motors to relieve overloads either at starting or during running. They are claimed to effect very considerable economies in current consumption, especially in works where electric motors are frequently started and stopped. Those interested should apply to Thos. Broadbent and Sons, Ltd., Huddersfield.

THE HARDINGE CO.—This firm forwards from 120, Broadway, New York, its bulletin No. 13, descriptive of its modern conical grinding and crushing plant, which they originated. It is claimed that this is the most efficient type of grinding machinery for either wet or dry work, especially in working costs, as machines are available in all sizes, and self-feeding and discharging patterns are made, suitable for all kinds of grinding and crushing operations.

CROFTS (ENGINEERS), LTD.—This firm issues from the works at Thornbury, Bradford, a catalogue of 32 pages describing and illustrating various types of ball and roller bearings for power transmission in factories. The advantages in efficiency obtained from the use of such bearings is well known. It is only necessary to add that the firm supplies bearings for all types of brackets, blocks, loose pulleys, clutches, etc. Tables of maximum loads for various sizes are also included.

BARTER TRADING CORPORATION, LTD.—This firm will be pleased to forward to readers on application to its office at Imperial House, Kingsway, W.C.2, a very useful price list of various chemicals in commercial quantities, covering Industria, Chemicals and Raw Materials, Coal Tar Products and Intermediates of the Benzene, Naphthalene and Anthracene series, Fertilisers, Oils, Fats, Waxes, and Wood Distillation products. Current prices and the range of market prices for last year are given for each chemical, making a useful and convenient list.

THE LILLESHALL CO., LTD.—This firm forwards from Oakengates, Shropshire, booklets describing filter presses, vacuum dryers, condensers, etc. Various filter presses are described, both of the recessed and the plate and frame types, suitable modifications being available for brewers, varnish manufacturers, oil mills, cement, soap, china clay works, gold extraction, etc. Centrifugal mixers, steam and vacuum dryers are also described in modifications suitable for an equally wide range of industry. The firm also specialises in steam condensing plant, of which particulars are given.

THE DIAGRAPH STENCIL MACHINE CO., LTD.—The Diagraph, a modern labour-saving machine for cutting flexible oilboard stencils, manufactured by the Diagraph Stencil Machine Co., Ltd., 82, Mark Lane, Fenchurch Street, London, E.C.3, is well worth the attention of chemical manufacturers, whose business entails the marking of cases, crates, barrels, etc. Manufactured in three sizes, and occupying about the same space as a type-writer, the Diagraph would save the time otherwise wasted in hand-cutting, and make irregularities in spacing and alignment impossible. The firm states that there are upwards of 25,000 diagraphs already in use.

BOILERINE, LTD.—This firm is issuing free an interesting booklet, containing a lecture given before the Association of Engineer Surveyors (otherwise known as the Boiler Inspectors of the various Insurance companies), by Mr. H. S. Wills, F.C.S., on "Waters, their classification, properties and treatment," which contains a scientific investigation of the nature and prevention of "scale" formed by heating various samples of natural waters in ordinary boilers, etc., and shows directly the advantages of the addition of the firm's product, "Boilerine," to prevent the scaling. The booklet may be obtained on application to the firm at 885A-897, Old Kent Road, London, S.E.15.

BRUSH ELECTRICAL ENGINEERING CO., LTD.—This firm has issued a catalogue of 32 illustrated pages dealing with various types of transformers and cooling tanks for the same. Matter is included showing the advisability of the core type and describing the special methods of construction adopted at the firm's works. Finally there are descriptions of transformers for special work such as electric furnaces, or in connection with rotary converters, or underground operation in collieries, etc. The title of the catalogue is "Transformers" and the firm will be pleased to supply copies to readers on application to their office, Maxwell House, 11, Arundel Street, Strand, London, W.C.2.

A. GALLENKAMP AND CO., LTD.—Part I. of the general catalogue consists of over 500 pages bound in boards, and deals with laboratory ware and apparatus of all kinds, including balances and weights. A speciality is made of "Vitreosil" ware, which is identical in properties with fused silica but is opaque, and is obtainable at less than half the price of the transparent product. This catalogue is a necessity in every laboratory, since laboratory ware is continually in need of replacement. Small separate lists deal with electrically heated apparatus such as ovens, baths and plates, and another list with apparatus for electrolytic experimental work, now becoming of greater importance in industrial chemistry. Copies of the above are obtainable from the firm at 19–21 Sun Street, Finsbury Square, E.C.2.

Recovery and Rectification of Benzol

Observations at Langley Park Works

MR. T. JOHNSON presided over a general meeting of the Northern Section of the Coke Oven Managers' Association on Saturday, March 24, at Durham, when a paper was read by Mr. T. Westhorpe, Langley Park, on "Observations on the Recovery and Rectification of Benzol."

Mr. Westhorpe pointed out that as there were many coke works where benzol was recovered and not rectified, and as a number of plants were being erected for the recovery of benzol, it would be useful to make some observations on practice found satisfactory at Langley Park coke works. The coal used was a typical Durham coking coal, containing 2·5 per cent. moisture and 24-26 per cent. volatile matter, and was carbonised in a relatively dry state. The plant consisted of a battery of 75 ovens of the Otto Waste Heat type with direct ammonia recovery and napthalene extraction. The exhausters were placed immediately before the benzol scrubbers, and scrubbing took place with the gas above atmospheric pressure and counter current to the oil. There were three scrubbers of the tower type, and the total space for benzol absorption was 8,750 cubic feet approximately, and the volume of the gas to be washed was approximately 6·4 million cubic feet per 24 hours, 640 tons of coal being carbonised per day. Their experience with the tower type of scrubber had led them to form a good opinion of it. The plant had worked nearly eight years, and had required no attention beyond the usual paint. The volumetric efficiency of the tower scrubbers when working under proper conditions was about 95 per cent. The governing factors for maximum benzol recovery were sufficient scrubbing capacity, uniform arrangement of the packing, suitable quality and quantity of the wash oil, correct temperature of gas, correct temperature of oil, and correct gas velocity.

It would be obvious that, for economic reasons, the various factors enumerated could only be controlled within certain limits, but for any particular plant, once those factors had been experimentally determined, every effort should be made to keep them uniform. The tower capacity should be ample, not less than 15 cubic feet per ton of coal carbonised per day, and more for the higher volatile coal, especially if the gas was not well cooled. Their packing was of the well known wooden grid type, and the total resistance put on by the three scrubbers corresponded to a 2-inch water pressure.

Wash Oil

Regarding wash oil, they had used coal tar creosote, Scotch blast furnace oil, and at present were using American gas oil. The last promised to be very satisfactory for benzol absorption. To those who had not used it the following data might be of interest as indicating its chief characteristics :—

Distillation test (flask) bulb in vapour.

Water, nil.			
2	per cent.	oil to	200 C.
14	,,	,,	250 C.
53	,,	,,	300 C.
83	,,	,,	350 C.
99	,,	,,	395 C.

Specific Gravity at 15·5 C. = 0·860

Viscosity at 20 C. = 45 seconds per 50 cc. (Redwood).

The residue distilling over 300 C. showed under the same conditions a viscosity of 80 seconds. The oil, being so fluid, was easily heated and cooled, and having a high boiling range, a sharp separation of the benzol was possible ; also, compared with other wash oils, less steam was required for debenzolisation. Its absorption efficiency for benzol was quite equal to that of either tar oils or blast furnace oils.

With regard to the quality of wash oil generally, opinions differed. Numerous and different specifications had been suggested from time to time, but so far as he was aware no oil from coal tar, shale or blast furnace tar, distilling within different intervals over the range of 200 to 400 C. had been shown to have markedly greater miscibility with benzol than the other. The few occasions when they had had cause for grievance were when solutions of organic or inorganic solids had been sent to them as wash oil. On one occasion they found the heating efficiency of the superheater before the debenzolising oil still fall off very rapidly—25 per cent. within 24 hours. On examination it proved to be due to a scale one-eighth of an inch thick, almost entirely of sodium carbonate, which had deposited upon the steam coil.

From their observations they would consider the chief criteria for a satisfactory wash oil to be freedom from water ; freedom from constituents boiling below 220 C. ; freedom from solids boiling above 300 C. ; freedom from suspensions, organic and inorganic ; low viscosity. One of the best wash oils they had used gave a distillate as low as 45 per cent. at 300 C. Their best results, Mr. Johnson stated, when using coal tar creosote or Scotch blast furnace oil were obtained when the viscosity on the Redwood Viscometer was 200 to 250 seconds per 55 cc. at 20 C. and they tried to keep it within those limits as long as possible.

Langley Park Plant

With regard to gas temperature, the lower that could conveniently be kept the better. Their experience confirmed that of other observers that at temperatures above 25 C. the falling off in the recovery increased rapidly, particularly if, at that temperature, the viscosity of the oil much exceeded the upper limit previously stated. The pumps serving the various scrubbers and debenzolising still at Langley Park were of the double acting plunger type, belt driven from a counter shaft at the rate of 12 h.p. The maintenance cost of the pumps over the 7½ years constant use had been the price of two new valves and the occasional adjustment of bearings. So far as the benzol washer was concerned, the mild steel shell was still in use and good for some years yet. The cast iron conical bottom was renewed when badly honeycombed. The washer was not lined, as their practice did not require it. One practical point of importance was that the cast iron cocks proved so unsatisfactory that they were discarded in favour of the regulus metal valve, which had given every satisfaction.

Freedom from Scale

The amount of dry steam required was affected very materially by the condition of the heating tubes—*e.g.*, freedom from scale and pitchy films. Those exerted a very great resistance to the transmission of heat. A film ⅛ inch thick might reduce the volume of oil which could be treated by 20 per cent. to 40 per cent., depending on the viscosity of the oil. In their case the benzolised oil contained approximately 2·5 per cent. of washable products when using creosote oil or blast furnace oil as absorbants. If the oil was not completely denuded of its benzol, there was certain to be loss at the scrubbers, even if all the other conditions were favourable. That necessitated that the oil before entering the still be heated to about 120° C. varying the temperature up or down according to its physical condition.

They had a curious experience once when examining the heating coil of the blowing over still. The tubes had been removed from the still and put under steam pressure for the purpose of locating a leak, when suddenly they threw off sparks, and the whole surface began to glow, spontaneous combustion taking place. That proved to be due to a deposit of sulphide of iron which had accumulated on the surface of the tubes. It would be readily appreciated how that occurrence might have led to serious consequences. It was their practice to wash benzol, toluol, and solvent naphtha all together, in the proportion in which they existed in the light oil. That procedure they found satisfactory and economical, 42 gallons (1·27 per cent.) of D.O.V. sufficing to wash 3,300 gallons of the raw product. Seven gallons of D.O.V. were first put through to dry the benzol. The remaining 35 gallons were then used to complete the acid washing. They recovered at the acid regenerator, in diluted form, approximately 20 per cent. of the D.O.V. used in the washing process, which left an actual consumption of 1·21 per cent. to be debited to benzol washing. The average loss at the washer was 2·4 per cent. of the raw benzol treated. Whilst getting rid of practically all the sulphonable bodies at the washer, they left in solution most of the polymerable substances. Those constituted the residue after final distillation, and were the base of a grease which they made and used at their collieries and ironworks. The alkali used in rectification was soda ash, which was satisfactory and cheap. A 12 per cent. solution was used, using for each batch washed 4 per cent. of its volume. No water washing was done on the benzol after treatment with either acid or alkali, as that set up troublesome emulsions.

Paint and Varnish Technology

MR. J. B. DUNCAN, M.Sc., F.I.C. (Cookson and Co., Ltd., Newcastle), in a recent lecture at the Birmingham Municipal Technical School, on "How white lead is manufactured," described the production of pure lead from its ores, and the processes of smelting, improving, desilverising, and refining. In regard to the manufacture of white lead by the Stack process, it was stated that a typical stack set with 90 tons of lead contained in addition over 150 tons of other materials, including bark, acid, pots and cover boards. To demonstrate how much the corrosion of the blue lead was dependent upon the fermentation of the bark, charts were shown illustrating typical stack temperatures taken during the period of corrosion, and attention was drawn to the poor yields obtained from stacks in which the fermentation of the bark was unsatisfactory. It was further stated that the actual percentage of corrosion was not merely dependent upon the fermentation of the bark, but was also affected by the amount of lead set in a stack, the thickness of the straps or buckles, and the length of the period of corrosion, and without a full knowledge of all these conditions the phrase "percentage of corrosion" was misleading. The Chamber process was shown to be a true corrosion process, similar to the Stack process, but differing from it in that the conditions were under scientific control, resulting in the formation of a uniform product of excellent colour and quality.

The further treatment of the corroded white lead—viz., grinding, levigation, washing, filter-pressing, and drying—was illustrated. It was also shown how ground white lead paste was produced by the "wet-pugging process" direct from the filter-pressed material by the direct incorporation of oil, and the principle was illustrated by a direct experiment. Typical analyses of Stack and Chamber white lead were next shown and brief explanations given. The uniformity of the Chamber product was strikingly demonstrated. The presence of normal lead carbonate, $PbCO_3$, which is found to a varying extent in white lead, was illustrated by photo-micrographs of crystals of lead carbonate obtained from samples of Stack lead, and a method was indicated for determining the approximate amount. The lecture concluded with a brief reference to lead-poisoning, and it was shown what a remarkable improvement had taken place in the health of the workers owing to their hearty co-operation with the management in the carrying-out of the Home Office regulations.

The Nicholls Medallist

THE Nichols Medal, which is awarded annually by the American Chemical Society for the best original paper published during the year by any of its members, was this year presented to Mr. Thomas Midgley, jun., of the General Motors Corporation, for a paper on "The Chemical Control of Gaseous Detonation, with Particular Reference to the Internal Combustion Engine." The most outstanding point in the paper is the discovery that the detonation of the explosive charge, or "knocking," may be stopped by adding traces of organo-metallic compounds to the fuel, for instance, tetra-ethyl lead. This may have very important results in many directions, particularly in the efficiency of motor engines, where various makeshift expedients have been tried for years to overcome this difficulty. Though an engineer by profession, Mr. Midgley has investigated the problem from a chemical point of view, and the result of his investigations in what is virtually a new field is an excellent example of the value of research in practical problems.

French Potash

TRADE in French potash salts is fairly active, and especially in the later districts, and the demand for French kainit and sylvinite is improving. As might be expected at this time, some difficulty is being experienced in effecting prompt execution of orders for immediate delivery, and buyers are requested to assist by placing their requirements as early as possible. Compared with muriate and sulphate, a larger quantity of the lower grade potash salts is changing hands, and potash in general appears to be more favoured than in former years. Reports from abroad indicate that trade is sound, and that, especially in America, the prospect of increased sales is bright.—*French Potash Mines Bureau.*

Chemicals for British Malaya

IN common with other parts of the world there has been a decided improvement in trade generally in the Malay Peninsula, the improvement being most marked in the latter half of last year. The following statistics dealing with supplies of chemicals, drugs, dyes, etc., for the Malay region will be of interest to manufacturers and export merchants in this country. For the sake of comparison the statistics for 1921 are given, together with the figures for the year 1922 :—

IMPORTS AND EXPORTS, 1921.

	Imports.	Exports.
	£	£
Drugs and medicines	243,904	133,522
Soap	187,304	53,382
Chemicals	158,868	35,519
Perfumery and cosmetics	105,989	20,323
Druggists' and dentists' sundries	23,760	1,986
Acetic acid	23,462	7,199
Aniline dyes	10,693	959
Synthetic indigo	9,242	1,688

IMPORTS AND EXPORTS, 1922.

	£	£
Drugs and medicines	341,754	100,176
Soap	162,134	37,006
Chemicals	148,942	38,674
Perfumery and cosmetics	126,504	14,614
Acetic acid	118,924	9,527
Druggists' and dentists' sundries	15,084	1,236
Aniline dyes	6,466	2,560
Synthetic indigo	5,572	557

It should be explained that exports go mainly to Siam and the Siamese Malay States, Borneo, French Indo-China, and the Dutch Islands in the Archipelago. Acetic acid is used for the coagulation of latex on the rubber estates of Malaya. In 1921, when the output of rubber was lower and other chemicals were being used, the total import of acetic acid amounted to 48,660 gallons, with an export of 24,699 gallons. Last year the import rose to 387,594 gallons, while only 30,964 gallons were exported.

Alsatian Potash Output

IN order to correct a misunderstanding that has arisen in some quarters the following figures of the production of the Alsatian potash industry are given in the *Manchester Guardian Commercial* by Mr. J. C. Williams, of the French Potash Mines Bureau :—

Year	Crude potash salts. Metric tons	Potash K_2O. Metric Tons
1913	365,341	62,540
1914	325,880	57,455
1915	114,358	20,127
1916	204,474	35,987
1917	320,131	56,343
1918	333,499	58,695
1919	464,605	92,006
1920	1,061,196	199,175
1921	900,000	110,500
1922	1,350,000	230,000

The average yearly production during the past few years under French administration has been nearly three times that of 1913, when the mines were under German control. Taking 1921, the year in question, the output of pure potash (K_2O) was 110,500 tons, as against the German 62,540 tons in 1913.

Invaluable to the Research Chemist

A WELL-KNOWN research chemist writes under date March 14, 1922 :—"I have taken THE CHEMICAL AGE regularly for some years past through newsagents. Should I not have received a copy of the *Year Book?* If it is as good as THE CHEMICAL AGE I would not willingly miss it. To me THE CHEMICAL AGE is invaluable. As a technical research chemist I am liable to lose touch with branches of technical chemistry with which I am not in contact. The purely trade papers are too empirical, and appear to me to be without 'vision.' THE CHEMICAL AGE attains the perfection of balance between the technical and scientific aspects of chemistry. I sincerely thank you for the great assistance it has been to me."

Society of Chemical Industry

Papers Before the Nottingham Section

At a meeting of the Nottingham Section of the Society of Chemical Industry, held on Wednesday, March 21, the first paper read was a description of a new derivative of salvarsan by Mr. L. Anderson, M.Sc.,A.I.C. A short historical account was given of arsenicals, beginning with the preparation of the supposed anilide of ortho-arsenic acid by Becamp in 1863, the identification of this compound "atoxyl" as the sodium salt of p. amino-phenylarsinic acid by Ehrlich and Bertheim in 1907, and the introduction of the improved preparations salvarsan, or 606, and neo-salvarsan, or 914, by Ehrlich in 1909 and 1911 respectively. The author then gave some experimental details of the preparation of these substances. There is considerable variation in the composition even of different batches of the same make, and this variable chemical composition appears to have no definite relation to the observed variability in physiological action. Salvarsan in the form of its dehydrochloride is soluble in water, but with an acid reaction, and has to be carefully neutralised before use. Neo-salvarsan gives a neutral solution, but is even more indefinite in composition than salvarsan. These compounds are also unstable, *e.g.*, 914 has to be kept in sealed ampoules with an indifferent gas. In 1920 it was noticed that salvarsan can be combined with glucose, and the conditions were carefully investigated. The resulting compound, which is probably a salvarsan diglucoside, is soluble in water with a neutral reaction, is more stable than the original salvarsan and compares favourably with this in therapeutic properties, as revealed by comparative experiments on mice.

Extensive trials have also been carried out during the last two and a half years at venereal clinics with the most favourable results. There was a remarkable freedom from delayed toxic manifestations, such as salvarsan jaundice.

The second paper, read by Dr. E. B. R. Prideaux, was an account of the calculated changes in hydrion concentration set up during the neutralisation of fairly strong but sparingly soluble acids, and in conjunction with Mr. A. O. Bentley, Ph.C., an application of this theory to the titration, both of the total alkali and of the organic acid in the benzoates of sodium and ammonium and in sodium salicylate. Improvements were suggested in the ignition of total alkali to carbonate. Methods were described in which the benzoates and salicylates are decomposed by an excess of standard acid and the mineral acid and dissolved organic acid are determined in the filtrate with or without extraction with chloroform. A still quicker method consisted in the direct titration with standard acid in the presence of chloroform using a suitable acid-insensitive indicator such as bromphenol blue, followed by the titration with alkali and phenolphthalein.

Boom in British Dyes

Extensive new plant is being installed at the Huddersfield works of the British Dyestuffs Corporation to meet the growing demand created by the situation in the Ruhr, and by a greater public confidence in British acids, intermediates and dyestuffs.

"Compared with this time last year," Mr. J. H. Watterson, works manager at Dalton, states, "and even compared with the latter half of 1922, there has recently been a considerable increase in our production of acids, intermediates, and dyestuffs. This may be due in part to the Ruhr, but in my opinion it is due mainly to the strengthening of people's confidence in the quality and uniformity of what we are turning out. Dye-users, moreover, are always looking for a continuous supply of the right goods almost as much as for the right goods themselves. That is one reason why to-day many of them regard reparation material with much less favour than they did twelve months ago. Inquiries are coming to us even from the Continent. A week or two ago we had one from Brussels for mixed acid, and only the other morning we had another from Germany for nitric acid. This is something absolutely novel in the way of recent business in the English chemical industry, and is symptomatic of the general outlook at present. We are spending thousands of pounds at Huddersfield in essential extensions of plant to cope with the growing requirements, particularly for our increased range of intermediates and colours put on the market during the last eighteen months."

The Chemistry of Paints

Dr. R. S. Morrell (Mander Brothers, Wolverhampton) spoke on Friday, March 23, at the Birmingham Municipal Technical School, in connection with the series of lectures on Paint and Varnish Technology, on "Paints and Varnishes and the World's Work." The durability of paints, he said, depended to a great extent on the nature of the medium used, just as the durability of varnishes depended on the quality of the oils used, and also on the amount and quality of the resinous components. In the case of paints the effect of the pigment was, perhaps, less than the effect of the resin in a varnish on the durability. It was probable that if polymerisation or union between molecules of the components had occurred before oxidation of the oil, the oxidation product might be considerably stabilised towards weathering agencies, besides having a slightly higher refractive index, and in consequence a better lustre. Experience had shown that full-bodied polymerised oils gave more durable media in either a paint or varnish whether the oil be linseed oil or wood oil. As to the chemical composition of the products of an oxidised drying oil, it was of the highest importance that the whole of the oxidation process be studied in a much more thorough manner than had been done up to the present. Everyone was familiar with the spotting or chalking of varnishes. In elastic oil varnishes it was evidence of incomplete oxidation and coagulation of the drying oil in the film, and was especially noticeable where linseed oil was present. It was advisable to allow as long a period as possible for air-drying before the varnish was exposed to the action of water or rain.

Dealing with the importance of lead pigments (white or red) as priming paints, he said that, supposing the pigment did not react chemically with the oil, its function was essentially that of a binder of the linoxyn produced when the oil was oxidised. It increased the viscosity of the mixing whilst the linseed oil was unoxidised and enabled thicker coats to be applied without the coat running on the work. Where there was interaction of pigment and medium, as in the case of basic pigments the product would be of the nature of a soap. The influence of colour, the proportions of oil and pigment, and the application of multiple coats depended essentially on changes brought about in the linoxyn of the dried paint. The influence of zinc oxide or zinc white mixed with other pigments in the gradual fading of colour was by no means understood, and it was particularly marked where gum arabic is used as a vehicle. Many of these changes had received no satisfactory explanation.

Damages against Lime Manufacturers

At the Birmingham Assizes on Wednesday, March 21, an action to recover damages for alleged breach of contract was brought by W. H. D. Davis, a farmer, from Robinson Brothers, Ltd., manufacturers and distributors of fertilisers, West Bromwich. The action, it was stated, arose out of the sale by the defendants of 24 tons of carbonate of lime required for spreading over land where hops were being grown. The plaintiff ordered 36 tons of carbonate of lime from the defendants, and received a consignment in February. It had, as was customary, to be distributed over the land by hand. Six acres were so treated. As a consequence four of the plaintiff's men suffered burns to their hands, which necessitated medical attenton. The plaintiff decided not to use any more and had some of it analysed. This analysis, it was alleged, showed that the stuff was composed of 33 per cent. of water, 64 per cent. of carbonate of lime, and probably contained some caustic alkali. This was not in accordance with the analysis supplied by the defendants' agent. The plaintiff had to get other fertilisers at more expense. It was admitted that the crop where the defendants' fertiliser had been applied was quite good. The other 30 acres were short to the extent of 2 cwt. per acre.

The Judge: It is a very curious action. He rejected the stuff and suffered because he didn't use it.

For the defendants it was submitted that the claim was irrecoverable by law. There was no evidence that the slight delay in obtaining other lime had caused any damage at all.

In giving judgment, his lordship said the defendants had paid £100 into court, and in his opinion had paid enough. He found for the plaintiff for £100 damages, the defendants to have costs subsequent to the payment of the amount into court.

From Week to Week

IT IS ANNOUNCED that the Council of State at Delhi has by 28 votes to 10 accepted the Government amendment doubling the salt tax.

THE DISCOVERY of extensive deposits of fuller's earth is reported in Southern Saskatchewan which may affect the present trade status of this commodity. Investigations are now proceeding.

OWING TO THE RISE in the mark, many German merchants, it is said, are now finding it difficult to sell their exported goods, and are adopting the pre-war expedient of selling at lower prices abroad than at home.

MR. YATES ENTWISTLE, of 110, The Albany, Old Hall Street, Liverpool, announces that he has been appointed selling agent for the Magadi Soda Co., Ltd., London, for Lancashire and district for soda ash, 58° alkali.

QUEENSLAND cotton-growers are making every effort to keep out the American boll-weevil pest. Should this obtain any footing in the State, it will at once cause a large demand for calcium arsenate and other poisons.

THE Board of Trade has approved a type of breathing apparatus, known as the Blackett's Aerophor Brown-Mills Apparatus, manufactured by Messrs. Guest and Chrimes, Ltd., Rotherham, for use at rescue stations and mines.

PRODUCTION of nitrate in Chile for February is cabled (in tons) as 124,000, against 64,000 in 1922, 149,000 in 1921, and 215,000 in 1914. Stocks in Chile February 28 were 986,000 against 1,483,000 in 1922, 1,258,000 in 1921, and 495,000 in 1914.

THE DANGER of lead poisoning is claimed to be removed for painters by the use of a new waterproof sand-paper recently invented by Mr. Klein, which may be used for rubbing down paint which has been wetted, so preventing the formation of dust.

THE PRICKLY PEAR is encroaching largely on cultivated areas in Queensland, and scientific investigations are being made by the Government as to the best means of checking it. At present arsenic is being used, which is, however, obtained locally.

PROFESSOR J. A. EWING, in a letter to *The Times* on Tuesday, pointed out the need for gifts, such as Sir Alfred Yarrow's recent donation, for the Universities, which were not so rich as is sometimes supposed, and always required assistance to enable them to increase their value as a national asset.

IT IS ANNOUNCED that a new ferment has been discovered by Mr. H. Langwell and Mr. H. Lloyd Hind, capable of producing alcohol from waste material, such as hop residues and wastepaper pulp. In addition to the alcohol a considerable volume of combustible gas is obtained in the process.

SOME 300 employees of Messrs. Burgoyne Burbidge and Co., wholesale manufacturing chemists and druggists at East Ham, struck work on Monday as a protest against proposed wage cuts. They also demanded the elimination of all non-unionists in the employ of the firm and the full recognition of the National Drug and Chemical Union.

LIEUT.-COLONEL G. R. LANE-FOX, M.P., Secretary for Mines, announces that he has appointed Sir Frederick L. Nathan, Mr. J. D. Morgan, M.Sc., Mr. W. Rintoul, F.I.C., and Professor R. V. Wheeler, D.Sc., to be a Sub-Committee of the Explosives in Mines Research Committee, to carry out investigations on the means employed for firing explosives.

AN OUTBREAK of fire occurred on Wednesday, March 21, in the works of Messrs. Hugh Highgate & Co., oil, grease and tallow refiners, Murray Street, Paisley. The loss is estimated to be about £150,000, which is covered by insurance. The firm intends to provide temporary means of carrying on business, and as soon as possible they will reconstruct the refining plant.

MR. ENEA DE CESARIS, described as a manufacturer of vermin killer, 9, Ampthill Square, Hampstead, London, whose statement of affairs showed liabilities £2,010, of which £1,400 was expected to rank, and estimated assets £137, attended at the London Bankruptcy Court on Wednesday, March 21, for his public examination, and after he had been shortly examined regarding his trading and affairs the examination was ordered to be concluded.

A MISHAP, involving the loss of two lives, occurred on Thursday, March 22, at the Yorkshire Coking and Chemical Works, Glass Houghton, near Castleford. Two bricklayers were engaged on the top of a smudge container, capable of holding about 200 tons, when suddenly the crust gave way, and the two sank. Both men were suffocated in a very brfei period, although help was given at once. At the inquest a verdict of "Accidental Death" was returned.

A COMPANY named "Salts and Chemicals" has established a plant at Dana, Saskatchewan, to exploit the sodium sulphate deposits that the Muskakee Springs yield every year. About 30,000 tons of salt cake will be produced annually with the present plant. Magnesia metal is another product stated to be of rich possibilities, which will be extracted by an electrolytic process. The metal is lighter, three times stronger than aluminium, and is coming in demand for aeroplane construction.

A LECTURE on "Safety First in Industry" was delivered by Mr. Edwin J. Wallace, of the National Employers' Mutual General Insurance Association (Limited) in Maryhill Burgh, Glasgow, on Saturday, in which he showed how accidents could be prevented by education of the workmen by an organised campaign, educating them to habits of caution, which could only carried out by the organised effort of staffs specially trained to deal with the problems and difficulties presented.

THE SCIENCE BRANCH of the Old Students' Association of King's College, London, held its annual informal supper in the College on Tuesday evening, March 20, and a most enjoyable evening was spent under the chairmanship of Mr. S. Hinks, F.I.C. The arrangements were made by Messrs. L. T. M. Gray, B.Sc., F.I.C., and H. Moore, M.Sc., F.I.Phys. Inquiries concerning the Association will be welcomed from old King's men by Mr. R. J. Browning, B.Sc., F.I.C., 9, Exbury Road, S.E.6.

PROFESSOR W. P. WYNNE, D.Sc., F.R.S., professor of chemistry in the University of Sheffield, has been elected president of the Chemical Society in succession to Sir James Walker. Professor Wynne went to Sheffield just before the University was opened. He designed the chemical laboratories at the university, and has organised a successful department. He has published a number of papers on chemical research and served as president of the Chemistry Section of the British Association in Birmingham in 1913. At the annual dinner of the Chemical Society last week Sir James Walker presided, and the speakers included Sir C. Sherrington, Dr. A. W. Crossley, Professor Henry le Chatelier, M. Paul Kestner, Mr. A. Chaston Chapman, and Sir R. Gregory.

THE SIR JESSE BOOT LECTURE was given on Friday, March 23, by Professor F. S. Kipping, F.R.S., the subject being "Cellulose and Cellulose Products." The raw materials of the cellulose industry were first reviewed, and the difference between cellulose and the products of its hydrolysis explained. The manufacture and properties of cellolose nitrate in its various forms and of textile materials prepared by the collodion, cuprammonium, alkali and bisulphide, and acetyl processes were demonstrated by experiments and by exhibits of thread fabrics and sheet from Messrs. Courtaulds and the British Cellulose Company. Of special interest was an experiment showing the dyeing of a fabric in two colours in a single bath, as in the process of Mr. Hunter, of Nottingham.

THE DECISION of the Irish Free State to impose an *ad valorem* duty of 33⅓ per cent. on certain classes of English-made goods imported into Southern Ireland, has created great anxiety among traders in the Free State area, though it is hoped that the provisions of Imperial Preference may reduce the duty from 33⅓ to 22½ per cent. The discussion in the Dail on Friday, March 23, threw little further light upon the subject. It has, however, made it clear that the Free State Government is resolved to go ahead upon the lines originally announced. The list of dutiable articles, which is very comprehensive, includes metallic tungsten, compounds of thorium, synthetic organic chemicals, analytical reagents, fine chemicals, scientific and optical apparatus and glass, laboratory porcelain, sugar, glucose, saccharin, etc.

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SULPHONES.—Preparation of aromatic sulphones. G. Fouque and J. Lacroix. *Bull. Soc. Chim.*, February, 1923, pp. 180–183.

BORNEOL.—Borneol from magnesium pinene hydrochloride. G. Vavon and A. L. Berton. *Bull. Soc. Chim.*, February, pp. 218–228.

CYCLIC COMPOUNDS.—Cyclohexanediols-1·2 and *o*-chlorocyclohexanol. M. Godchot. *Compt. rend.*, February 12, 1923, pp. 448–450.

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PAPER.—Colloid study of the rosin sizing of paper. Wo. Ostwald and R. Lorenz. *Kolloid Z.*, Part I, February, 1923, pp. 119–137; Part II, March, 1923, pp. 195–209.

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Patent Literature

Abstracts of Complete Specifications

193,431. Colouring Matters, Production of. A. H. Davies, R. F. Thomson, J. Thomas, and Scottish Dyes, Ltd., Murrell Hill Works, Carlisle. Application date, September 27, 1921.

The process is for preparing a new series of oxy-derivatives obtained from substances of the dibenzanthrone class, the iso-dibenzanthrone class, the substituted dibenzanthrone class, and the dinaphthol-imide class. These substances are referred to as "ketonic perylenes," and may be defined as substances containing the perylene nucleus which have other pairs of ring formations joined to the perylene nucleus at the 3 : 4 and 3′ : 4′-positions, and which have in these additional ring formations at least one ketonic group, *i.e.*, the whole molecule contains at least one pair of ketonic groups. It is found that these substances may be oxidised, yielding dyestuffs which may also be used as intermediates for the production of other dyestuffs. The oxidation products may be acted on by a mild reducing agent such as a bisulphite, yielding products of a similar kind. Both the oxidation and reduced products may be submitted to alkylation and acylation, yielding products which may be used as dyes or intermediates. An additive compound of a ketonic perylene or the like and sulphuric acid may be obtained by dissolving the ketonic perylene in the acid, and precipitating the additive compound by means of a small quantity of water. The ketonic perylenes themselves may be isolated by treating the additive compounds with a large volume of water. As examples of alkylating agents, methyl hydrogen sulphate, dimethyl sulphate, ethylene, dibromide, benzal chloride, and diphenyl dichlormethane are mentioned; and as acylating agents, sodium acetate with acetic annydride, benzoyl chloride, benzoic acid, and succinyl chloride are mentioned. Examples are given of products obtained starting with the oxidation product of dibenzanthrone, isodibenzanthrone, dinaphthalimide, etc.

193,450. Filter Elements. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 14, Huxter, Hamburg, Germany. Application date, June 23, 1922.

These filter elements are for use with the ultra filter presses constructed, as described in Specification No. 155,834 (see The Chemical Age, Vol. IV., p. 313), or for filter electrodes, or for electro-osmotic apparatus. The annular filter elements are built up of separate members of fine wire netting, in which the strands of the warp are closer than those in the weft, *e.g.*, in the ratio of three to one. When used for separating colloidal substances the pores of the filter are made smaller by passing through it a suspension of tar, clay, gypsum, cement, etc., and in special cases, a further constriction is obtained by immersing the filter element in a substance impermeable to colloids, such as solution of rubber or cellulose ester.

193,451. Rubber, Manufacture of. P. Schidrowitz, 57, Chancery Lane, London, W.C.2. Application date, September 24, 1921.

Rubber latex is subjected to vulcanisation with sulphur or other vulcanising agent under such conditions as to prevent any substantial coagulation during vulcanisation. A solution or colloidal suspension of vulcanised rubber in water is obtained. A suitable substance for preventing coagulation is sodium sulphide, or an alkaline or basic reagent such as ammonia or piperidine. The alkali may be added in conjunction with the vulcanising agent, *e.g.*, as an alkaline poly-sulphide. A proportion of a colloidal substance such as casein may be added to the mixture, and assists in preventing coagulation. The quantity of vulcanising agent, the use of accelerators and the application of heat are dependent on the condition of the latex and the presence of preservatives. The vulcanised rubber remains in colloidal suspension for a considerable time, and may be separated by adding a coagulant such as acetic or sulphuric acid. The suspension of vulcanised rubber may be used for impregnating fabrics, and the disadvantages associated with the usual rubber solvents are avoided. The rubber suspension is less viscous than a rubber solution containing the same proportion of rubber.

193,520. Mica, Asbestos or Similar Silicates, Process for the Production of Plastic Masses from. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 26, Jarrestrasse, Hamburg, Germany. Application date, November 29, 1921.

The process is for utilising residues from the working of mica and asbestos for the production of a plastic substance which may be moulded. The residue is subjected to dispersion with water in a colloid mill, as described as Specification No. 155,836 (see The Chemical Age, Vol. IV., p. 313), using a dispersion accelerator such as collidal silicic acid or alkali silicates. The dispersion is dried *in vacuo* below 60° C. in a rotary drying drum, and the dry powder may be pressed either warm or cold into any desired shape. The material may be rendered elastic by the addition of rubber or other filling materials. The colloidal dispersion may be used as a binding material for a further quantity of a finely divided but non-colloidal silicate. The products are suitable for electric insulation.

193,521. Refining of Mineral Oils, Petroleum, Benzine and other Hydrocarbons, Process for. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 26, Jarrestrasse, Hamburg, Germany. Application date, November 29, 1921.

Mineral oils, petroleum and the like are refined by the use of chlorinated alcohols. It is found that when the oil is treated with chlorhydrins, particularly dichlorhydrin, the unsaturated hydrocarbons are obtained unchanged as a separate layer mixed with the chlorhydrin. These unsaturated hydrocarbons may subsequently be used for the synthetic production of rubber, artificial resins, etc. The purifying agent is preferably mixed with the oil in a colloid mill in the presence of air. Examples are given of the purification of benzine, petroleum, and crude petroleum jelly. This process avoids the subsequent neutralisation with alkali, which is necessary when oil is purified by sulphuric acid.

193,524. Mixtures of Rubber and Artificial Resins, Process for the Production of. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 26, Jarrestrasse, Hamburg, Germany. Application date, November 30, 1921.

Mixtures of rubber and artificial resins are not readily obtained owing to the fact that the usual solvents of the one are not solvents of the other. In the present invention it is found that if rubber and a synthetic resin are mixed on the usual mixing rolls or mills in the presence of a liquid which exerts a swelling action on both, a plastic mixture of the two may be obtained. Alternatively, the materials may be subjected to mechanical disintegration in a colloid mill, as described in Specification No. 155,836 (see The Chemical Age, Vol. IV., p. 313). The synthetic resins employed may be phenol-formaldehyde condensation products, formaldehyde-acetone or formaldehyde-furfurol, or other product obtained by condensation or polymerisation. Dichlorhydrin may be used as swelling agent for rubber, and also acts as a solvent for phenol-formaldehyde condensation products, but better results are obtained by using a mixture of dichlorhydrin and cyclohexanol. In an example, 90 parts of semi-solid phenol-formaldehyde and 10 parts of rubber are treated in a rubber mixing mill with 30 parts of β-dichlorhydrin and 20 parts of cyclohexanol until the mixture becomes homogeneous. The solvents may then be evaporated *in vacuo*. Any filling materials may be added, and also sulphur, in which case the mixture may be vulcanised to produce a hard product. The process may be used as a means for hardening rubber or for rendering a synthetic resin more elastic.

193,546. Ores, Treatment of. E. C. R. Marks, London. From the Merrill Co., 121, Second Street, San Francisco, Cal., U.S.A. Application date, December 5, 1921.

In treating some ores by the cyanide process for the recovery of the metals, it is found that the dissolved metals may be prematurely removed from the solution owing to the presence of certain deleterious substances in the ore. This difficulty is found when the ore contains carbonaceous material such as graphite, and the cyanide process cannot then be used as a

commercial process. In this invention the ore is treated with a protective oleaginous substance which insulates or neutralises the graphite or the like, and prevents the premature removal of the dissolved metals. The nature and quantity of oleaginous substance necessary depends on the ore, but in some cases it is found that 5 lb. of coal-tar per ton of ore is sufficient. Crude oil, or fuel oil with an asphaltic base, may also be used. The ore is ground in water containing the oleaginous substance, and the water is removed by decantation or filtration. The residue is then subjected to the cyanide process. In the case of relatively rich ores, a better recovery is obtained if the ore pulp is dried before its treatment with cyanide. The drying temperature should not exceed 300° F., and is found that a smaller quantity of cyanide is required. In an example, a Canadian ore containing gold and silver gave a yield of 57 per cent. of the gold and silver when treated by the cyanide process alone, but when subjected to preliminary treatment, according to the present invention, a yield of 95 per cent. was obtained.

193,551. Formic Aldehyde, Process for Solidifying. W. Carpmael, London. From Chemische Fabrik auf Actien (vorm. E. Schering), 170/171, Mullerstrasse, Berlin. Application date, December 6, 1921.

Formic aldehyde is obtained in solid form by treatment with calcium lactate. In an example, a solution of 600–700 grams of calcium lactate in 500 grams of formic aldehyde of 35 per cent. strength is heated under a reflux condenser to 90° C., yielding a clear solution which, when cooled, solidifies to a crystalline mass. This substance contains about 12 per cent. of formic aldehyde and is soluble in water. Formic aldehyde may be evolved by the addition of hot water. Alternatively, solutions of the two ingredients may be mixed and then allowed to solidify.

193,575. Separating or Isolating Organic Gases or Vapours of Organic Products. Farbenfabriken vorm. F. Bayer & Co., Leverkusen, near Cologne-on-Rhine, Germany, and A. Engelhardt, Wiesdorf, Niederrhein, Kaiserstrasse 19, Germany. Application date, December 16, 1921.

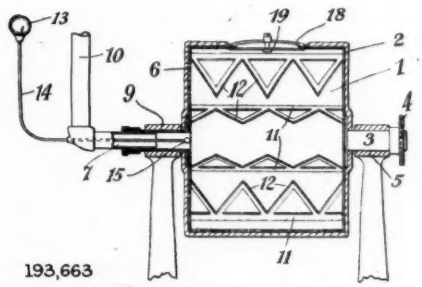
The process is of the kind described in Specification No. 156,543 (see The Chemical Age, Vol. IV., p. 376), in which a mixture of an organic gas or vapour with air or other gas, such as hydrogen, is treated with porous charcoal to absorb the organic substance. In the present invention a porous active charcoal is used, which contains sulphur. The sulphur may be added by treating the charcoal with a mixture of hydrogen sulphide and air, the sulphur being precipitated in the charcoal in a finely divided form. Charcoal may absorb 50 per cent. of its weight of sulphur in this manner, and is then capable of absorbing 40 per cent. of its weight of benzene from air containing 30 grams of benzene per cubic metre. The benzene may be recovered by treating with superheated steam. The charcoal is liable to become heated to its ignition point during the absorption, and to avoid this it may also contain water.

193,618. New Chloro-ethyl-ester, Manufacture of, and the Treatment of Phenols, Alcohols and Amino Compounds therewith. British Dyestuffs Corporation, Imperial House, Kingsway, London, W.C.2, and W. H. Perkin and G. R. Clemo, The Laboratories, Souths Parks Road, Oxford. Application date, January 19, 1922.

The process is for the manufacture of the β-chloroethyl ester of toluene *p*-sulphonic acid $CH_3C_6H_4SO_2OCH_2CH_2Cl$). This ester is obtained by boiling toluene-*p*-sulphonic chloride with ethelene chlorhydrin, and then distilling off at reduced pressure the excess of ethylene chlorhydrin. The residue may be extracted with benzene, and finally fractionated *in vacuo*. The ester is a syrup which may be distilled without decomposition at 210° C., at a pressure of 21 mm. The ester reacts with phenol in the presence of a sodium hydroxide, yielding phenol-β-chloroethyl ether and diphenyl-ethylene ether. In a similar manner chloroethyl ethers are obtained from *o*-cresol, *p*-nitro-*o*-cresol and the naphthols. When aminophenols are treated, the amino group must be protected by acetylation before treatment. The ethers obtained with phenols may be treated with aromatic amines or monoalkylamines such as ethylaniline, yielding the β-phenoxyethyl derivative of the base. The ester may also be treated with benzyl alcohol yielding a benzyl-β-chloroethyl ether. The latter may be treated with diethylamine yielding β-diethylaminoethyl-benzyl ether. This base combines with ethyl iodide yielding the iodide of triethyl-amino-ethylbenzyl ether. The β-chloroethyl ester also reacts with aniline, yielding diphenyl-ethylene-diamine and diphenylpiperazine. The ester may also be treated with methylaniline, yielding dimethyl-diphenyl-ethylenediamine and β-chloroethyl-methylaniline. The latter condenses with β-naphthol in the presence of alkali yielding β-naphthyl-oxyethyl-methylaniline. Detailed examples are given of the manufacture of phenyl-β-chloroethyl ether; β-naphthyl-β-chloroethyl ether (which may then be nitrated); diphenyl-ethylene diamine; diphenyl-piperazine; symmetrical dimethyl-diphenyl-ethylene diamine; β-chloroethyl methylaniline; benzyl-β-chloroethylether; orthoacetamino-phenyl-β-chloroethyl ether; and the corresponding para-acetamino compound.

193,663. Hydrazo-benzol and Homologues, Method for Deriving. F. B. Dehn, London. From H. J. Lucke, 2, Rector Street, New York. Application date, February 15, 1922.

Hydrazo-benzol, hydrazo-toluol or the like may be obtained by the reduction of nitrobenzol or corresponding homologue by means of nascent hydrogen generated by means of caustic soda and zinc flakes or granules, having a large mass and small surface area compared with zinc filings. The reaction temperature may rise to 98° C., and is maintained by the heat



193,663

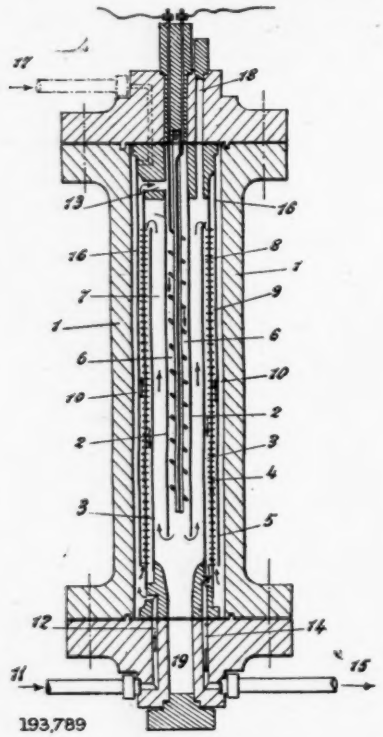
of the chemical action. A steel drum 1 is mounted on a horizontal axis, one end of which is in the form of a hollow trunnion 7 communicating with an exhaust passage 10. The interior of the drum is provided with radial shelves 11, at the edges of which may be arranged open agitating devices 12. These point towards the centre of the drum, and are arranged out of line in adjacent shelves. A pyrometer 15 may be connected to an indicator 13, outside the apparatus. The drum is charged in succession with water, caustic soda, nitrobenzol and zinc, and the inlet opening is then sealed and the drum rotated at 15–20 revolutions per minute. The reaction is completed in 14 to 18 hours, the termination being indicated by a fall of temperature to 50° C. The hydrazo-benzol may then be separated from the other products and then converted into benzidine, giving a yield of 80 per cent. This process avoids the necessity for continuously supplying zinc in the form of dust.

193,722. Products Soluble in Water from Hydrocarbons of High Boiling Point of Tar Oils, Manufacture of. W. Moeller, 20, Billhorner-Canalstrasse, Hamburg, Germany. Application date, March 25, 1922.

Hydrocarbons of the higher boiling fractions of coal tar oil are treated with sulphur. The crystalline hydrocarbons, such as anthracene and phenanthrene, are converted into resinous amorphous compounds which remain dissolved, and coumarone is converted into an elastic material. The thick liquid material thus obtained is treated with sulphuric acid yielding sulphonated substances which are soluble in water and may be used as tanning agents. The preliminary treatment with sulphur enables a final product of high molecular weight to be obtained, which is a better tanning agent than that obtained by the direct sulphonation of the oil.

193,789. CATALYTIC SYNTHESIS OF AMMONIA, APPARATUS FOR. L. Casale and R. Leprestre, 9, Via del Parliamento, Rome. Application date, August 24, 1922. Addition to 185,179.

The apparatus comprises three concentric tubes, an outer pressure-resisting tube 1, an intermediate tube 3, and an inner tube 2. The reaction gases are supplied through the pipe 11 and pass upwards between a partition 16 and a partition 4.



193,789

The space between the partition 16 and the tube 1 acts as an insulator. The gas then passes through a conduit 13 to the central tube 2, where it is heated by an electric heater, and thence upwards through the catalyst in the space 7. The hot gas then passes downwards through the space 8 between the tube 3 and partition 4 so as to preheat the incoming gas, and the conducting partition 4, through which the heat passes, may be corrugated. The gas finally leaves through the outlet 15. An opening 18 is provided for the introduction of catalyst.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under The International Conventions :—170,591 (E. Barbet et Fils et Cie.) relating to the removal of tar from the vapour arising from the distillation of wood, see Vol. V., p. 775 ; 186,035 (A. L. Kreiss) relating to phosphatic fertilisers, see Vol. VII., p. 716.

International Specifications not yet Accepted

192,089. GAS PRODUCERS, ETC. J. J. Deschamps, 11, Route de la Croix, Le Vésinet, Seine-et-Oise, France. International Convention date, January 21, 1922.

The process is applicable to gas-producers, blast furnaces, line or cement ovens, distilling and condensing apparatus, or in any apparatus in which a porous material is subjected to the action of a fluid under pressure or undergoing distillation or other chemical action. The reaction is facilitated by producing pressure variations in the material by periodically opening and closing the inlet or outlet valves. The valve may be a rotating disc, mounted eccentrically with respect to the conduit, and having openings of different sizes which periodically come into line with the conduit, thus producing a pressure pulsation. More rapid pulsations may be produced by means of a pivoted oscillating plate in a chamber communicating with the conduit.

Specifications Accepted, with Date of Application

174,569. Fractional condensation of petroleum or other vapours, Apparatus for Griscom-Russell Co. January 25, 1921.

174,611. Oxidising liquid hydrocarbons, Process of. E. Zerner. January 29, 1921.

194,339. Precipitating or recovering metals from their solutions. H. Bardt. October 10, 1921.

194,340. Electrodes suitable for electrolytic operations. Process for the manufacture of. H. Bardt. October 10, 1921.

194,353. Metals contained in ores, Process for recovering. H. S. Mackay. November 11, 1921.

194,355. Porous metallic bodies, Process for manufacturing. K. Katsumori. November 12, 1921.

194,361. Washing and scrubbing gases. Apparatus for. E. Cockey and Sons, Ltd., H. K. Hiller, and J. F. Harrison. December 3, 1921.

194,428. Electrolytic cells. I. Cranston and W. D. Le Bar. December 17, 1921.

194,495. Extracting oil, fat, wax, and the like from seeds, nuts and other materials and substances which contain the same by means of a solvent. C. Downs and R. A. Bellwood., January 31, 1922.

194,520. Gas or air washers or scrubbers. J. B. Hansford. February 20, 1922.

194,556. Grinding or crushing mills. A. Fischer and G. O. Pfarr. March 24, 1922.

194,576. Dyestuff preparations for household use. F. Parker and H. M. Parker. April 18, 1922.

194,625. Sulphate of ammonia, Manufacture of. R. P. Douglas. August 17, 1922.

Crisis in the Superphosphate Industry

OWING to the serious conditions existing in the superphosphate industry, it will come as no surprise when it is stated that a crisis has been reached, says a correspondent in *The Times Trade Supplement*. Faced with imported superphosphate, placed on sale in this country at prices actually below the cost of production at a British factory, the industry has decided to inform the Government of its position and the line of action it proposes to take.

In a letter on the subject to the Minister of Agriculture the Fertiliser Manufacturers' Association, Limited, again draw attention to the serious menace to the industry due to the abnormally low prices of superphosphate imported from the Continent. British makers have for many months past been quoting prices under cost with the object of retaining business, thus providing employment for their men, and by encouraging delivery, relieving the pressure of work usually experienced in their factories during the active spring season. This policy has not produced any material results. Continental makers have now increased their prices. The prices of superphosphate have been raised in the last two months in France by about 25 francs and in Belgium by about 50 francs. At the normal rate of exchange these increases would be equal to about 20s. and 40s. respectively per English ton. Concurrently, however, the premium on sterling has risen, so that the new increased prices in francs works out in British currency to even lower figures than before. If the franc continues to depreciate, the sterling price of imported superphosphate may come down lower still. It is, therefore, obvious that British makers cannot be expected to compete against continually falling exchange rates. British makers are to-day faced with the necessity of deciding either—(*a*) to close down the manufacture of superphosphate until times become more normal ; (*b*) to continue to manufacture and sell at a loss at the prices now quoted for imported superphosphate ; or (*c*) to raise their own prices to a figure which shall at least cover the cost of production and necessary overhead charges on their total year's working and to dispose of what they can thereat. It appears to be the general opinion amongst them that the interests of all concerned—agriculturists, works employees, and their own shareholders—will alike be best served by the last-named of these three courses. The object of the letter is to remove any impression that British makers are in any way endeavouring to extract an undue profit out of the presumed necessity for superphosphate for the land. As was the case during the period of Governmental control of the industry, arrangements will willingly be made whereby all information as to cost of production and any other data required will be placed, through the medium of the Association, at the disposal of the Department or of any committee of inquiry that may be set up.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

London, March 28, 1923.

THIS week has closed with a quieter tone and with the holiday spirit much in evidence. Prices remain very steady, with the tendency upward where any change is apparent.

There is still considerable export inquiry. Business is passing, although many of the orders have still to be referred back for higher limits.

General Chemicals

ACETONE.—The demand remains very active and parcels are absorbed immediately on arrival. The price is remarkably firm.

ACETIC ACID.—Higher prices are fully maintained and spot supplies are practically non-existent. The market remains an eager buyer.

ACID CITRIC is very firm in price, although the immediate demand is small.

ACID FORMIC is dearer, supplies from the continent having practically ceased.

ACID LACTIC is without special feature.

ACID OXALIC is rather a slow market, but the price is fully maintained.

ACID TARTARIC is very firm indeed. Much better business is reported, and makers are looking for higher prices.

ARSENIC is unchanged.

BARIUM CHLORIDE is a firm market and the value is inclined to harden.

FORMALDEHYDE is a firm market, although being of the hand-to-mouth variety. Any increase in demand might be expected immediately to affect the price substantially.

LEAD ACETATE is again dearer and the demand is good.

METHYL ACETATE is a very firm market with little or nothing available for prompt.

POTASSIUM CARBONATE.—Unchanged.

POTASSIUM CAUSTIC.—Unchanged.

POTASSIUM PERMANGANATE is higher in price and stocks are scarce.

POTASSIUM PRUSSIATE is a fairly good market, and the price is very firm.

SODA ACETATE remains very scarce, and the price is higher.

SODA BICHROMATE is without special feature.

SODA HYPOSULPHITE is in fairly good demand; price unchanged

SODA NITRITE is in better demand, and the price is firm.

SODA PRUSSIATE is a firm market, and the price is well maintained.

SODA SULPHIDE.—Unchanged.

ZINC OXIDE.—Unchanged.

ZINC SULPHATE is in fair demand. The improved tendency is upheld.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID continues in good demand, makers' production being sold well ahead.

ACETANILIDE is unchanged and is selling freely at last prices.

ACID SALICYLIC is active, with price well maintained. If carbolic remains at its present level, the upward movement should continue.

AMIDOPYRIN has been quiet, and slightly easier on the spot. The export demand continues, and continental manufacturers are sold well ahead.

BARBITONE is scarce and should advance still further.

BROMIDES.—Leading continental manufacturers have almost doubled their prices, the effect of which should reflect on this market before long. There is already a distinctly firmer tendency.

CHLORAL HYDRATE is steady and in fair demand.

EUCALYPTUS OIL, owing to lack of demand, is easier, the principal consuming season being now over.

HEXAMINE has advanced in sympathy with the continental market.

HYDROQUINONE tends to harden, and higher prices are now asked in many directions.

MERCURIALS are steadier, mercury having recovered after its recent fall.

METHYL SALICYLATE is in good request, with the price a shade higher.

PHENACETIN is firmer. There is room for considerable improvement, as stocks cannot be replaced at the present level.

PHENAZONE has been advanced by makers.

PHENOLPHTHALEIN is difficult to replace, increased prices being asked by continental manufacturers.

SODA SALICYLATE is in good request and extremely firm.

SALOL has advanced sharply, the export demand being considerable.

SODA BENZOATE is inclined to harden. The makers report large orders.

VANILLIN.—The tendency is upwards.

Coal Tar Intermediates

This market has been quieter in view of the approach of the holidays, but a moderate inquiry is maintained.

ALPHA NAPHTHOL is very firm and has been the subject of considerable interest, while stocks are very short.

ALPHA NAPHTHYLAMINE is firm and some home business has been booked, while export inquiries are in the market.

ANILINE OIL.—Some home inquiry has been received.

BENZIDINE BASE has been a firm home trade at recent values.

BETA NAPHTHOL is rather quiet, but inquiries are about.

DIMETHYLANILINE is firm, and some home business has been booked.

"H" ACID is steady.

NAPHTHIONIC ACID is rather easier.

NITRO BENZOL.—The usual orders have been received.

PARANITRANILINE is steady, and home buyers are interested.

PHTHALIC ANHYDRIDE.—Some export inquiry.

SULPHANILIC ACID.—A few home orders have been received.

Coal Tar Products

No substantial change since last week's report is to be recorded.

New Premises for Chas. Page & Co.

CHAS. PAGE AND CO., LTD., the well-known chemical merchants, announce that they will be removing their head offices on Tuesday next, April 3, to more commodious premises situated at 37–39, King William Street, London. Telegrams: Inland, "Paganini, Cannon, London"; foreign, "Paganini, London." Telephone: City 5408 (8 lines). All departments will now be housed under one roof, and this will enable the firm to increase the efficiency of their service, and at the same time will prove a convenience to their clients.

Reduced Grants for Research

IN view of the imperative needs for economy in national expenditure, the sums which will be available for scientific research in the coming financial year are lower in the aggregate than in 1922–23. The reductions occur largely under the head of administrative expenses, and although any reduction is to be regretted, the allocation made of the available funds should enable the immediately essential work in hand to be maintained. For the Department of Scientific and Industrial Research the aggregate net estimate amounts to £276,863, a decrease on the total for the current financial year of £20,574.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	7	to	0	1	9
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99–100%	ton	69	0	0	to	70	0	0
Acetic, 80% pure	ton	48	0	0	to	49	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	55	0	0	to	60	0	0
Carbolic, cryst. 39–40%	lb.	0	1	7	to	0	1	8
Citric	lb.	0	1	9	to	0	1	10
Formic, 80%	ton	52	10	0	to	53	0	0
Hydrofluoric	lb	0	0	7½	to	0	0	8½
Lactic, 50 vol.	ton	41	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.	ton	27	0	0	to	28	0	0
Oxalic	lb.	0	0	6¾	to	0	0	7
Phosphoric, 1.5	ton	40	0	0	to	42	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, Technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	4	to	0	1	4½
Alum, lump	ton	12	10	0	to	13	0	0
Alum, chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14–15%	ton	7	10	0	to	8	0	0
Aluminium, sulphate, 17–18%	ton	9	10	0	to	10	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
Ammonia, .880	ton	32	0	0	to	34	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to	0	0	4½
Ammonia, chloride	ton	50	0	0	to	55	0	0
Ammonia, muriate (galvanisers)	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure)	ton	35	0	0	to	40	0	0
Ammonia, phosphate	ton	65	0	0	to	68	0	0
Ammonia, sulphocyanide, com'l, 90%	lb.	0	1	1	to	0	1	3
Amyl acetate	ton	175	0	0	to	185	0	0
Arsenic, white, powdered	ton	70	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Barium carbonate, Precip.	ton	15	0	0	to	16	0	0
Barium, Chlorate	ton	65	0	0	to	70	0	0
Barium Chloride	ton	17	0	0	to	17	10	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	1	0	to	0	1	1
Bleaching powder, 35–37%	ton	10	10	0	to	11	0	0
Borax crystals	ton	28	0	0	to	32	0	0
Calcium acetate, Brown	ton	11	10	0	to	12	0	0
,, ,, Grey	ton	19	15	0	to	20	0	0
Calcium Garbide	ton	16	0	0	to	17	0	0
Chloride	ton	6	0	0	to	7	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	105	0	0	to	110	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	2	to	0	1	3
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	92	10	0	to	95	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	92	10	0	to	95	0	0
Formusol (Rongalite)	lb.	0	2	2	to	0	2	3
Glauber salts, commercial	ton	5	0	0	to	5	10	0
Glycerin, crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	2	to	0	2	3
Iron perchloride	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	42	0	0	to	44	0	0
Carbonate (White Lead)	ton	45	0	0	to	48	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	5	10	0	to	6	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	58	0	0	to	60	0	0
Methyl acetone	ton	71	0	0	to	75	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	41	0	0	to	42	0	0
Ammonium sulphate, double salt	ton	41	0	0	to	42	0	0
Potash, Caustic	ton	33	0	0	to	34	0	0
Potassium bichromate	lb.	0	0	5¾	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	10	0	to	10	10	0
Chlorate	lb.	0	0	4½	to	0	0	4¾
Metabisulphite 50–52%	ton	84	0	0	to	90	0	0
Nitrate, refined	ton	43	0	0	to	45	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	4	3	to	0	4	6
Prussiate, yellow	lb	0	1	5½	to	0	1	6
Sulphate, 90%	ton	12	10	0	to	13	10	0
Salammoniac, firsts	cwt.	3	3	0	to	—		
Seconds	cwt.	3	0	0	to	—		
Sodium acetate	ton	24	15	0	to	25	0	0
Arsenate, 45%	ton	48	0	0	to	50	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3½	to	0	0	3¾
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	6	to	0	1	7
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	28	0	0	to	29	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	0	11	to	0	0	11½
Prussiate	lb.	0	0	9½	to	0	0	9¾
Sulphide, crystals	ton	10	10	0	to	11	0	0
Sulphide, solid, 60–62%	ton	16	10	0	to	17	10	0
Sulphite, cryst.	ton	12	10	0	to	13	0	0
Strontium carbonate	ton	55	0	0	to	60	0	0
Strontium Nitrate	ton	40	0	0	to	42	0	0
Strontium Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Sulphur, Flowers	ton	11	10	0	to	12	10	0
Roll	ton	11	0	0	to	12	0	0
Tartar emetic	lb.	0	1	4	to	0	1	5
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	40	0	0	to	42	0	0
Dust, 90%	ton	45	0	0	to	47	10	0
Sulphate	ton	16	10	0	to	17	10	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	2	to	0	3	6
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	2	9	to	0	3	0
Salicylic, B.P.	lb.	0	2	2	to	0	2	6
Tannic, leviss	lb.	0	3	4	to	0	3	6
Amidol	lb.	0	8	6	to	0	8	9
Amidopyrin	lb.	0	13	0	to	0	13	6
Ammon ichthosulphonate	lb.	0	2	0	to	0	2	3
Barbitone	lb.	0	14	6	to	0	15	0
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7½	to	0	0	8
Potash	lb.	0	0	7	to	0	0	7½
Soda	lb.	0	0	7½	to	0	0	8½
Caffeine, pure	lb.	0	12	0	to	0	12	3
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Calcium lactate	lb.	0	2	0	to	0	2	3
Calomel	lb.	0	4	9	to	0	5	0
Chloral hydrate	lb.	0	4	0	to	0	4	3
Cocaine alkaloid	oz.	0	18	0	to	0	18	6
Cocaine hydrochloride	oz.	0	14	9	to	0	15	0
Corrosive sublimate	lb.	0	4	3	to	0	4	6
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	6	to	0	1	6½
B.P. (75–80% eucalyptol)	lb.	0	1	7	to	0	1	7½
Guaiacol carbonate	lb.	0	8	3	to	0	8	6
Liquid	lb.	0	9	0	to	0	9	6
Pure crystals	lb.	0	10	0	to	0	10	6
Hexamine	lb.	0	4	3	to	0	4	6
Hydroquinone	lb.	0	3	3	to	0	3	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	18	6	to	1	0	0
Lithia carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	6	to	0	2	9
Metol	lb.	0	9	6	to	0	10	0
Milk sugar	cwt.	4	15	0	to	5	0	0
Paraldehyde	lb.	0	1	6	to	0	1	9
Phenacetin	lb.	0	5	9	to	0	6	3
Phenazone	lb.	0	7	3	to	0	7	6
Phenolphthalein	lb.	0	5	0	to	0	5	3
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3		—		

	Per	£	s.	d.		£	s.	d.
Resorcine, medicinal	lb.	0	5	3	to	0	5	6
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	6	to	0	3	0
Salol	lb.	0	2	6	to	0	2	9
Soda Benzoate	lb.	0	2	3	to	0	2	6
Sulphonal	lb.	0	13	6	to	0	14	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	12	0	to	0	12	6
„ soda salicylate	lb.	0	7	9	to	0	8	3
Vanillin	lb.	1	3	6	to	1	4	6

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Alphanaphthol, refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9½	to	0	0	10
Aniline salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	0	to	0	3	3
Benzidine, base	lb.	0	5	0	to	0	5	3
Benzidine, sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	6	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	7	to	0	1	9
Dimethylaniline	lb.	0	3	0	to	0	3	3
Diphenylamine	lb.	0	3	9	to	0	4	0
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Neville Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	8	to	0	0	8
Nitronaphthalene	lb.	0	1	0	to	0	1	1
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol, base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Para-amidophenol, hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	9	to	0	6	3
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/10 spot	0	2	0
Bay		0	11	0
Bergamot	firmer	0	12	0
Cajuput		0	3	9
Camphor, white	per cwt.	4	0	0
Camphor, brown	„	3	15	0
Cassia	c.i.f. 7/9 spot firmer	0	8	3
Cedarwood		0	1	6
Citronella (Ceylon)	firmer	0	3	3
Citronella (Java)	firmer	0	3	10
Clove		0	7	6
Eucalyptus		0	1	6
Geranium Bourbon	firmer	1	8	0
Lavender		0	11	0
Lavender spike		0	3	0
Lemon		0	2	11
Lemongrass	per oz.	0	0	2¾
Lime (distilled)		0	3	0
Orange sweet (Sicilian)		0	9	6
Orange sweet (West Indian)		0	9	0
Palmarosa		0	17	6
Peppermint (American)		0	13	0
Mint (dementholised Japanese)		0	6	6
Patchouli		1	12	0
Otto of Rose	per oz.	1	4	0
Rosemary		0	1	8
Sandalwood	firm	1	6	0
Sassafras		0	5	0
Thyme	(firm) according to quality 2/6 to	0	8	0

Synthetics.		£	s	d.
Benzyl acetate		0	3	0
Benzyl benzoate		0	3	0
Citral	easier	0	10	0
Coumarine		0	12	6
Heliotropine	firmer	0	6	6
Ionone	easier	1	5	0
Linalyl acetate		1	2	6
Methyl salicylate	very firm and scarce	0	2	6
Musk xylol		0	9	0
Terpeniol	firm	0	3	0

Tar Still Manufacture

An indication of the state in which the coke oven industry has been for some considerable time may be gathered from the fact that the Leeds and Bradford Boiler Co., Ltd., of Stanningley, near Leeds, the well known tar still manufacturers, have only 23 stills on order at the present time against 43 at this time last year. It may be mentioned that the bulk of the 23 stills at present on order are repeat orders. For many years the company has specialised on tar stills and tar distilling plant, and has ceased the manufacture of boilers, leaving all its energies to be turned in this direction.

A few of the special points in the construction of their stills are the following :—The top and bottom plates, all being pressed at one heat by hydraulic power between dies, giving the exact radius, are perfectly smooth, and for that reason have no flats or weak places, this being very important in the bottoms. Also the metal is not fatigued and damaged by hammering. This incidentally reduces the corrosion which is more severe on metal which has been ill-treated, and is an important point in tar stills. Stills of this firm's make have gone more than eleven years without being repaired, or having the bottom replaced, but of course the length of life is very considerably affected by the quality of the tar. All rivet holes in the bottom are drilled in position concentrically after the plates are pressed to shape. Besides giving a perfectly fair hole, the advantages of drilling over punching are well known. In addition to this, by standardising the bottoms the firm can supply a replace set of bottom plates, or a single plate to rivet on to the channel with all the holes ready drilled, Their run off pipes are specially strong, the riveting flange instead of being the weakest part is the strongest, being actually thicker than the pipe itself. All riveting of the bottom, top, and all except one seam of the shell, is done by hydraulic power, and all caulking by pneumatic power. These improved methods, together with the large experience accumulated, explain the high standing of the firm's products.

Appointment for Mr. C. S. Garland, M.P.

The King (in Council) has appointed Mr. C. S. Garland, M.P. to the governorship of the Imperial College of Science, rendered vacant by the resignation of the Hon. Nathaniel Rothschild. Mr. Garland, who is M.P. for South Islington, is works manager and managing director of the Volker Lighting Corporation, Ltd., the Clay Ring Co., Ltd., and W. A. Ward and Co., Ltd., and a director of Thorium, Ltd. He is also a Fellow of the Institute of Chemistry, a Vice-President of the Society of Chemical Industry, and a member of the newly-formed Institution of Chemical Engineers. He has been responsible for the establishment and erection of many commercial plants for important chemical products.

Manchester Chemical Manufacturer's Failure

The adjourned public examination of Mr. Bertram Levin, 16, Deansgate, Manchester, chemical manufacturer, was held recently at the Court House, Manchester. According to the statement of affairs the liabilities amounted to £8,188 against assets £9,101.

Debtor stated that if he were left to work out his assets, he would be able to pay all his liabilities in full. The examination was again adjourned.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, March 28, 1923.

THERE is little change in the position of the Chemical Market to record this week. Prices asked for spot material of German manufacture continue to increase although shipments have not altogether been suspended.

Numerous inquiries are being received from Germany and the Continent.

Industrial Chemicals

ACID ACETIC.—Glacial 98/100% £64 to £69 per ton; 80% pure, £45 to £48 per ton; 80% technical, £44 to £47 per ton, c.i.f. U.K. ports duty free.

ACID BORACIC.—Unchanged crystal or granulated, £55 per ton; powdered, £57 per ton, carriage paid U.K. stations.

ACID CARBOLIC.—Crystals, quoted 1s. 8d. per lb. but difficult to obtain.

ACID FORMIC 80%.—Still on offer at £57 per ton, ex store.

ACID HYDROCHLORIC.—Unchanged at 6s. 6d. per carboy, ex works.

ACID NITRIC, 84°.—£27 10s. per ton, ex station, full truck loads.

ACID OXALIC.—In little demand. Quoted 7d. per lb., ex store.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full loads. Dearsenicated quality, £1 per ton more.

ACID TARTARIC.—Quoted 1s. 2½d. per lb., ex store.

ALUM, LUMP POTASH.—Good export inquiry. Price about £10 10s. per ton, f.o.b. U.K. Offered at £13 per ton, ex store for home consumption.

AMMONIA ANHYDROUS.—No change in price 1s. 6d. per lb., ex station.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4¼d. per lb., delivered.

AMMONIA MURIATE.—Grey galvanisers quoted £31 to £32 per ton, f.o.r. works.

AMMONIA SULPHATE.—25¼%, £15 10s. per ton; 25¾% neutral, £16 13s. per ton, ex works, March-May delivery.

ARSENIC, WHITE POWDERED.—Moderate inquiry. Now quoted £78 per ton, ex quay.

BARIUM CHLORIDE, 98/100%.—English make about £18 per ton; Continental about £14 10s. per ton, c.i.f. U.K., but delivery doubtful.

BARYTES.—Finest English white powdered, £5 5s. per ton, ex works.

BLEACHING POWDER.—Spot lots, £11 10s. per ton, ex station. Contracts, 20s. per ton less.

BORAX.—Crystal or granulated, £28 per ton; powdered, £29 per ton, carriage paid U.K. stations.

CALCIUM CHLORIDE.—English material, £5 15s. per ton, ex quay or station. Continental slightly less.

COPPERAS, GREEN.—Quoted £2 15s. to £3 per ton, f.o.b. U.K. port.

FORMALDEHYDE, 40%.—Spot lots still available at about £93 per ton, ex store.

GLAUBER SALTS.—Fine white crystals, £4 per ton, ex store.

LEAD, RED.—English make unchanged at £43 per ton, carriage paid U.K. Continental make about £37 per ton, ex store.

LEAD ACETATE.—White crystals about £39 10s. per ton, ex store. Brown quoted £37 per ton, ex store.

MAGNESITE, GROUND CALCINED.—Price, £8 10s. per ton, ex station.

MAGNESIUM CHLORIDE.—Still offered from the Continent at about £3 10s. per ton, c.i.f. U.K. Spot lots about £5 per ton, ex store, but little demand.

MAGNESIUM SULPHATE (EPSOM SALTS).—Commercial, £7 per ton; B.P., £8 10s. per ton; Continental commercial quality offered at £5 per ton, ex store.

POTASH, CAUSTIC, 88/92%.—Now quoted £35 per ton, ex store, spot delivery.

POTASSIUM BICHROMATE.—English makers' price unchanged, 5¼d. per lb., delivered.

POTASSIUM CARBONATE.—96/98% spot lots offered at £32 per ton, ex store; 90/92% about £28 per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at 3d. per lb., ex store.

POTASSIUM MURIATE.—Offered at £9 per ton, basis 80%, f.o.r. works.

POTASSIUM NITRATE (SALTPETRE).—About £31 per ton, ex store; little inquiry.

POTASSIUM PERMANGANATE.—B.P. quality, 10¼d. per lb., ex store; commercial about 9d. per lb.

POTASSIUM PRUSSIATE (YELLOW).—Inclined to be easier at 1s. 5¼d. per lb., ex store.

POTASSIUM SULPHATE.—Offered at £7 5s. per ton, basis 80%, f.o.r. works.

SODIUM ACETATE.—Quoted £24 10s. per ton, ex wharf, early delivery.

SODA, CAUSTIC.—76/77%, £21 10s. per ton; 70/72%, £20 per ton; 60/62% broken, £21 5s. per ton; 98/99% powdered, £24 17s. 6d. per ton, ex station. Spot delivery. Good export inquiry.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay, or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—English makers' price unchanged, 4½d. per lb., delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; Alkali 58%, £8 17s. 6d. per ton, ex quay or station. Spot delivery.

SODIUM CHLORATE.—Offered at 3d. per lb. ex store.

SODIUM HYPOSULPHITE.—Commercial, £10 10s. per ton; pea crystals, £15 10s. per ton, ex station.

SODIUM NITRATE, 96/98%.—Refined quality, £13 10s. per ton, f.o.r., or f.a.s., U.K.

SODIUM NITRITE, 100%.—Unchanged, £27 to £29 per ton, according to quantity.

SODIUM PRUSSIATE (YELLOW).—Quoted 9d. per lb., ex store.

SODIUM SULPHATE (SALTCAKE, 95%).—Price to home consumers, £4 per ton, on contract.

SODIUM SULPHIDE, 60/62%.—Continental offers of £15 10s. per ton, c.i.f., U.K. Spot lots about £16 15s. per ton, ex store.

SULPHUR.—Flowers £10 per ton; roll, £9 per ton; rock, £8 per ton; ground, £8 per ton. Prices nominal.

TIN CRYSTALS.—Unchanged at 1s. 2d. per lb.

ZINC CHLORIDE.—98% solid English material, £25 per ton, f.o.b., U.K. port.

ZINC SULPHATE.—Quoted £14 10s. per ton, ex station.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ACETANILIDE.—Export inquiry. Price quoted, 1s. 10d. per lb.

ALPHA NAPHTHYLAMINE.—Good demand for export. Price quoted, 1s. 6½d. per lb., f.o.b.

ANILINE OIL.—Price firm at 11½d. per lb.

ANTHRANILIC ACID.—Export inquiry. Price quoted, 10s. per lb., 100% basis, f.o.b.

ANTHRAQUINONE.—Export inquiry. Price 3s. per lb., f.o.b.

BENZOL 90's.—Good inquiries for export. Price quoted 2s. 1½d. per gallon, f.o.b., drums included.

BETA NAPHTHOL.—Export inquiry. Price 1s. 1d. per lb., f.o.b.

BETA OXY NAPHTHOLIC ACID.—Price 10s. per lb., delivered.

CASSELLA "F" ACID.—Export inquiry. Price quoted, 10s. per lb., 100% basis, f.o.b.

CHROMOTROPE ACID.—11s. 6d. per lb., 100% basis.

DIMETHYLANILINE.—Some inquiries. Price 3s. to 3s. 1d. per lb., in returnable drums.

METANILIC ACID SODIUM SALT.—Export inquiry. Price quoted, 3s. 9d. per lb., 100% basis.

NEVILLE AND WINTHER ACID.—Supplies offered at 6s. per lb., 100% basis.

NITROTOLUENE.—Supplies offered at 11d. per lb., carriage paid.

PARA AMIDO SALICYLIC ACID.—Export inquiry. Price 7s. 6d. per lb., 100% basis.

PARANITRANILINE.—Home inquiry. Price quoted, 2s. 7d. per lb.

PHTHALIC ANHYDRIDE.—Small export inquiry. Price 2s. 3d. per lb., f.o.b.

SULPHANILIC ACID.—Export inquiry. Price 1s. 5d. per lb., 100% basis, f.o.b.

The Manchester Chemical Market

(From Our Own Correspondent.)

Manchester, March 28, 1923.

There are plenty of inquiries circulating in the chemical market here, though actual business done during the past week has been rather quiet. The pending holiday stoppage has probably something to do with the more subdued feeling. The undertone, however, still seems healthy, and with a steady demand from many of the big industrial consumers at home and a fairly good inquiry from overseas markets the chemical trade should experience a reasonably active time. On the whole, prices keep steady.

Heavy Chemicals

Caustic soda is very firm at from £19 per ton for 60 per cent. to £21 10s. for 76-77 per cent. strength, with a steady demand for home and export. Bleaching powder is in good inquiry for home consumers at £11 10s. per ton, a fairly active demand also being met with on export account. Soda crystals are rather quiet but unchanged in price at £5 5s. per ton delivered. Saltcake is firm at £4 10s. per ton, with a moderate amount of business being done both for home consumption and for shipment. Sodium sulphide, 60 to 65 per cent. concentrated, keeps quiet but steady at about £15 per ton, with crystals quoted at £9. Glauber salts are fairly active at £4 per ton. Bi-carbonate of soda is in rather good inquiry at £10 10s. per ton delivered to home users. Alkali is firm at £7 12s. 6d. per ton for 58 per cent. material, a steady home and foreign demand being met with. Hyposulphite of soda shows no improvement though quotations are steady at £15 10s. per ton for photographic crystals and £9 10s. to £10 for commercial. Nitrite of soda is also on the quiet side at £27 per ton. Phosphate of soda is unchanged in position or value at £15 to £15 10s. per ton. Chlorate of soda is unchanged in position or value at £15 to £15 10s. Chlorate of soda is firm and in active inquiry at 3d. per lb. Prussiate of soda is still quiet at 9½d. per lb. Bi-carbonate of soda is steady at 4½ per lb., sellers meeting with a fairly satisfactory demand. Acetate of soda is in short supply and prices are firm at about £24 per ton.

Caustic potash is again being actively called for and prices are firmer at £33 10s. per ton for 88–90 per cent. Carbonate of potash is in steady inquiry at £32 per ton for 96–98 per cent. material. Bichromate of potash is firm at 5¾d. per lb. Yellow prussiate of potash is still rather quiet, but prices are unchanged at 1s. 5¼d. per lb. Chlorate of potash is firmer at 3½d. per lb., an improved inquiry being reported. Permanganate is steady at 9d. per lb.

Sulphate of copper is fairly active at £26 10s. to £27 per ton. Arsenic is firmly held at £75 per ton for white powdered, Cornish makes, on a continued steady demand for shipment. Commercial Epsom salts are selling rather freely at £6 10s. per ton for British makes, with magnesium sulphate, B.P., quoted at about £7. Acetate of lime keeps in short supply; grey is very firm at £20 and brown at £10 10s. per ton. Nitrate of lead is rather firmer at £43 per ton. White sugar of lead is on offer at £39 to £40 and brown at £38 per ton.

Acids and Tar Products

Tartaric acid meets with a steady demand at 1s. 3d. per lb. Citric acid, B.P. crystals, is also selling freely at 1s. 8d. to 1s. 8½d. per lb. Acetic acid is being actively called for and prices are firmer; glacial is now quoted at £68 to £70, and 80 per cent. technical at about £47 per ton. Oxalic acid is a dull section at 6½d. to 6¾d. per lb.

The price of pitch is now in the neighbourhood of £9 to £10 per ton, f.o.b. Manchester, the export demand being well maintained though prompt supplies continue scarce. Carbolic acid crystals are unchanged from last week at 1s. 8d. per lb., with 60 per cent. crude at 4s. to 4s. 6d. per gallon, a steady inquiry still being reported for shipment. Benzol is steady at 1s. 8d. per gallon, with a slight expansion of the demand. Solvent naphtha is quiet but steady at 1s. 9d. per gallon. Creosote oil is firm and in steady demand at 9½d. per gallon. Refined naphthalene is now quoted at about £18 per ton, with crude at £7 to £11 according to quality.

A Disputed Alum Contract

In the Mayor's and City of London Court, on Thursday, March 22, before Judge Shewell Cooper, Mr. Kali N. Memon, trading as Memon, Son and Co., chemical merchants, 33, Great Tower Street, E.C., sued the British Danubian Trading Corporation, Ltd., 346, Strand, for £12 11s. for 24 casks ammonia chrome alum, medium crystals 13 per cent.

Mr. Guedella, for the plaintiff, said that the amount of the original account was £120. There was a counterclaim for damages for breach of contract in the delayed delivery of 5 tons of the goods. The counterclaim also alleged a defect in the quality which was not now persisted in.

Mr. Fuller, for the defendants, said it would have necessitated a commission being sent to Vienna, and the amount did not warrant it.

Mr. Guedella said that £2 would have obtained all the chemical talent in Vienna. The question was whether a delivery was made within due time under the contract. On September 21 there was an order for delivery of 10 tons of the alum f.o.b. Manchester. Then there was a request to re-mark the goods, and delays occurred for which the plaintiff was not responsible. The defendants bought against the plaintiff, alleging that they could do nothing else, as they wanted the goods.

The plaintiff said that delivery was for October. It was not the custom of the trade, when one was buying forward, to notify purchasers when the goods were ready for delivery. He knew that the defendants were buying for sale to someone else. In cross-examination, he said that the market did not rise, and that did not account for the delay in the delivery. The production was very much restricted.

Mr. Dawson, of the British Alizarine Co., Ltd., who manufactured the alum, spoke as to the deliveries.

Mr. Victor Small, the defendants' general manager, said they were continually urging the plaintiff for delivery. He said the works were busy, and the demand was so great that prices were rising daily. They never bought unless they had sold ahead. A claim was made against the defendants by the British Austrian Bank of Vienna for delayed delivery, and they had had to pay £12 11s. Therefore, they deducted that from the plaintiff's account. Shipping instructions were never given by them until they had information that the goods were ready for supplying.

Mr. Leonard Pearce, chemical merchant, High Holborn, said that the price of the alum in question in September and October varied slightly according to the quality taken, but the approximate price was £25 per ton. It was firming all the time. Most manufacturers put up their prices by £2 a ton in the middle of November.

Judge Shewell Cooper thought there had been a waiver of the strict terms of the contract. He did not think the defendants were entitled to succeed on their counterclaim as regards delayed delivery to entitle them to damages so far as the first 5 tons were concerned, but he thought the position was different with regard to the second 5 tons, and that they were entitled to something. He would give the defendants £5 on the counterclaim. Judgment for the plaintiff on the claim for £12 11s., and for the defendants for £5, each with costs.

Belgian Artificial Silk

The Commercial Secretary to H.M. Embassy at Brussels states that before the war Belgian manufacturers of artificial silk furnished about one-quarter of the world's total production. The daily output averaged 8.7 tons, or some 2,700 tons annually. Only four factories survived the war, and upon these reconstruction work was necessary. It was not before July, 1919, that one was able to resume activity. The others shortly followed suit, and by the end of 1920 production had been brought up to 70 per cent. of the pre-war capacity. The situation since then has considerably improved, and, notwithstanding the daily output having been increased to from 10 to 11.5 tons, demand now exceeds supply. The chief export market is found in Switzerland, which during the nine months ended 30th September, 1922, absorbed 122 tons. The United Kingdom took 21 tons, France 19.7 tons, the United States 5 tons, and other countries 9 tons, out of a total export of 187.5 tons, with a value of nearly six million francs.

Company News

ASBESTOS CORPORATION OF CANADA.—Quarterly dividends of 1¾ per cent. on the preference shares and 1½ per cent. on the common shares are announced, payable on April 15.

RIO TINTO CO., LTD.—The directors announce a further dividend of 20s. per share on the ordinary shares, making 30s. per share for the year. The balance carried forward is £447,981, against £421,275 a year ago.

UNITED GLASS BOTTLE MANUFACTURERS.—The net profits for 1922, after providing for debenture interest, were £37,867, and £29,077 was brought forward. The board have added £12,500 to the reserve, and recommend that the remaining £54,444 be carried forward.

RECKITT AND SONS, LTD.—At the annual meeting on March 23, it was decided to declare a total dividend and bonus equivalent to 17½ per cent.; to add £150,000 to reserve, and to carry forward £189,444, subject to corporation profits, and to pay £55,000 in bonuses to the workpeople.

ASSOCIATED PORTLAND CEMENT MANUFACTURERS, LTD.—The directors recommend a dividend for the year 1922 at the rate of 5 per cent. per annum on both the old and the new ordinary shares. Provision has been made in the accounts for depreciation, reserves and sinking funds amounting to £208,881, and, after providing for taxation, there remains a balance of £227,440 to be carried forward.

BARRY, OSTLERE AND SHEPHERD.—The accounts for the year ended January 31 show a profit, after providing for debenture interest, bad debts, depreciation, etc., of £326,428, to which is added £97,094 brought forward, making a total of £423,522. The sum of £60,000 has been added to the reserve fund and £105,000 has been written off balance of cost of redemption of rights of managing directors in profits of old companies. The directors propose a dividend of 15 per cent. and a bonus of 2s. per share, both less tax, on the ordinary capital, leaving £107,001 to be carried forward.

DHARAMSI MORARJI CHEMICAL CO., LTD.—The third ordinary general meeting of the shareholders was held on Wednesday, February 28, at the company's office, Sudama House, Ballard Estate, Fort, Bombay, Mr. Ratansi D. Morarji presiding. The directors' report showed that the years' working resulted in a loss of Rs. 54,556-3-6 but this was inevitable during the stage of construction. It was anticipated that the entire factory would commence to work from about June next. Under the agency agreement the managing agents are entitled to a remuneration of Rs. 36,000, but they have agreed to charge Rs. 15,000 only, this amount representing their actual out-of-pocket expenses. The report ending September 30, 1922, was adopted, the retiring directors being re-elected; the Hon. Mr. Pheroze C. Sethna and Mr. Ambalal Sarabhai were appointed additional directors; and auditors were re-appointed.

W. CANNING AND CO.—In proposing that the report of the directors and balance sheet be approved, Mr. E. R. Canning, presiding at the annual meeting on March 22, said the troubles from which they suffered last year had been removed, and they were able to report a better trading result. They had continued to devote earnest attention to the electro chemical side of the business, and were now able to give to manufacturers very valuable help in a manner that they had hitherto not been able to render so completely or on such a sound scientific basis. It might be news to some of the shareholders that they carried on business in Birmingham in six different buildings in six different streets, a fact which led to higher supervision charges than would be necessary if the business were not so scattered. They could see the way to considerable economies by building in one locality and concentrating the business. The resolution was carried, and Mr. T. R. Canning was re-elected a director.

Recent Wills

Mr. Walter George Jameson, of Woronzow Road, South Hampstead, and of Curtis and Co., wholesale and retail chemists..... £13,014

Mr. George Howard Taylor, of Marmion Road, Sefton Park, Liverpool, head of J. and J. Taylor, paint manufacturers..... £9,819

Mr. Edwin Percy Haslam, of Brunswick Terrace, Hove, formerly a director of Benn Brothers, Ltd., and manager of THE CHEMICAL AGE.... £14,586

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. NO.
British India ..	Soap and chemists' sundries.	—
Canada	Druggists' sundries.	—
Esthonia.....	Chemicals, oils, paints and varnishes.	—
France	Linseed oil.	—

Contracts Open

Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:

RIO DE JANEIRO.—Machinery for the manufacture of sulphite pulp. Particulars from Department of Overseas Trade, 35, Old Queen Street, London, S.W.1. Reference No. 6278/FL./MC.(2).

DURBAN.—Pyridine, simonsens oil and wood naphtha. Particulars from Department of Overseas Trade (Room 52), 35, Old Queen Street, London, S.W.1. Reference No. 10856/E.D./C.P.

EGYPT (April 17).—Oils, paints and varnishes. Particulars from Department of Overseas Trade (Room 53), 35, Old Queen Street, London, S.W.1. Reference No. 10205/F.E./C.C./2.

Tariff Changes

GREECE.—The import duties on the following articles are revised: Oil of turpentine; raw gums in general; mineral oils; tin, combined with other common metals; tin in blocks, sheets or bars; nickel, pure or combined; aluminium; metallic mercury; zinc, in blocks, bars or sheets, pure or alloyed; copper; brass; soap for washing wool; fuses for mines; suction pumps and pumps of all kinds; industrial machinery, parts, and accessories, etc.

HUNGARY.—An import licence is now required for salicylic acid. Export licence regulations are again revised, particulars being obtainable from the Department of Overseas Trade, Tariff Section, 35, Old Queen Street, Westminster.

Chemical Research in India

ACCORDING to the *Times of India* excellent progress has been made in chemical research at the Technological Institute, Cawnpore. Work had been done in the manufacture of soda ash, sulphuric acid, etc., even before the Institute was established, while further experiments at the Institute go to show that the difficulties experienced in obtaining soda ash could be overcome and a product secured which would be quite as good as the imported chemical. It has been proved from a careful examination of the resources of the Province, that the amount of soda ash, caustic soda, etc., that could be manufactured in this centre would more than cover the whole of India's requirements. The examination of one large area in particular showed that the salts averaged two parts of carbonate of soda to one part of sulphate of soda. This was dealt with by crystallising out a first crop of soda, while the residue, which consisted of about equal parts of carbonate and sulphate was treated by the black ash process, by which means a further quantity of soda was produced and sulphuric acid obtained as a by-product. After the sulphates are removed by crystallisation, a very good quality caustic soda remains. There are various ways of utilising the sulphates. It was evident from experiments conducted at the Technological Institute that, by means of electrolysis, the sulphate could be separated into caustic soda and sulphuric acid with high current efficiency and good energy efficiency. This, Dr. Watson, the Principal of the Institute, who recently made a comprehensive survey of the subject, thinks a very attractive process for making sulphuric acid on a comparatively small scale wherever it was required from locally available materials.

THE BRITISH ALIZARINE COMPANY LTD.

Manchester London Glasgow

Manufacturers of Alizarine Dyestuffs

ALIZARINE RED (all shades)

ALIZARINE BLUES (soluble and insoluble)

ALIZARINE BORDEAUX

ALIZARINE CYANINE

ALIZARINE GREEN (soluble and insoluble)

ALIZARINE ORANGE

ALIZARINE RED S. POWDER

ALIZARINE BLUE BLACK

ALIZARINE (MADDER) LAKES (of all qualities)

ALIZARINE MAROON

ALIZUROL GREEN (Viridine)

ANTHRACENE BROWN

ALIZANTHRENE BLUE

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Other fast colours of this series in course of preparation

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BRITALIZ LONDON
BRITALIZ GLASGOW

All communications should be addressed to
The British Alizarine Co., Ltd.
Trafford Park, Manchester

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

FONTEYN, M. P., 26, Elm Grove, W., olive oil importer. (C.C., 31/3/23.) £42 0s. 9d. February 12.

HALL, Harry H., Sladen Dyeworks and Bent House, Littleborough, Rochdale. (C.C., 31/3/23.) £10 15s. 2d. February 9.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.]*

PASTEX DYES, LTD., London, W.C. (M., 31/3/23.) Registered March 15, £1,500 debenture to E. B. Davies, Hughenden, The Embankment, Bedford; general charge. *£1,654 0s. 10d. December 29, 1922.

PORTSLADE SILICA AND TRADING CO., LTD. (M., 31/3/23.) Registered March 12, mortgage to bank; charged on Portslade Flint and Sand Pits, Portslade.

ROE ACRE DYEING AND FELTING CO., LTD. (late James Chadwick and Co. (Heywood), Ltd.). (M., 31/3/23.) Registered March 13, £45,000 debentures; general charge. *£5,000. July 3, 1922.

SILICA PRODUCTS, LTD., Sheffield. (M., 31/3/23.) Registered March 15, £700 mortgage to Pickford Holland and Co., Ltd., 482, Attercliffe Road, Sheffield; charged on properties at Ravenscar. *Nil. March 17, 1922.

SILVER SPRINGS BLEACHING AND DYEING CO., LTD., Timbersbrook. (M., 31/3/23.) Registered March 14, mortgages securing £1,701 8s. 9d. and further advances not exceeding in all £1,800, further charge by way of collateral security for £3,542 3s. 11d. and further advances not exceeding in all £3,600, and mortgage securing £3,542 3s. 11d. and further advances not exceeding in all £3,600, to North Staffordshire Permanent Economic Benefit Building Society; charged on properties at Buglawton, &c. *£21,280 15s. 5d. September 16, 1922.

Partnerships Dissolved

HODSON, THOMAS AND CO. (John Phillips KNOWLES and William Strother THOMAS), chemical engineers, Beech Buildings, Eccles New Road, Salford, by mutual consent as from March 17, 1923.

RALPH WILDE AND CO. (Ralph Joseph WILDE and Sydney Roger DAWSON), dyers, cleaners and lace finishers, Cranbrook Dye Works, Nunhead, S.E.15, and at Pokesdown, Bournemouth, under the style of the RAINBOW DYE WORKS, by mutual consent as from February 28, 1923. Debts in connection with the Cranbrook Dye Works, Nunhead, received and paid by R. J. Wilde, and debts in connection with the Rainbow Dye Works, Pokesdown, received and paid by S. R. Dawson.

New Companies Registered

BOW AND GILMOUR, LTD., 48, West Regent Street, Glasgow. Chemical manufacturers. Nominal capital, £7,000 in £1 shares.

BRYCE, ROBARTS AND CO., LTD., 43 and 45, Great Tower Street, London, E.C. Chemical merchants. Nominal capital, £10,000 in 9,900 ordinary shares of £1 each, and 2,000 deferred shares of 1s. each.

COWLEY CELLULOID, LTD., Bridge Works, Cowley, Middlesex. Manufacturers of and dealers in celluloid and articles made therefrom, etc. Nominal capital, £3,000 in £1 shares.

EASIT (MANCHESTER), LTD., 9, Lower Chatham Street, Chorlton-on-Medlock, Manchester. Manufacturing chemists. Nominal capital, £1,000 in £1 shares (500 ordinary and 500 7½ per cent. preference).

HOLDERS (LONDON), LTD. Chemical merchants and soap makers. Nominal capital, £5,000 in £1 shares. A director: H. N. Holder, Fairlight, Regent's Park Road, London, N.W.

LEWIS JAMESON AND CO, LTD., 83, Queen Victoria Street, London, E.C.4. Analytical, consulting, technical, and industrial research chemists, etc. Nominal capital, £500 in £1 shares.

MERRITAS MANUFACTURING CO., LTD., 14, Judge's Drive, Liverpool. Manufacturers of and dealers in blacklead, blue, starch, paints, pigments, dyeware, soaps, etc. Nominal capital, £3,000 in £1 shares (1,000 deferred and 2,000 ordinary).

A. PEARSON, LTD., 84, Station Street, Burton-on-Trent. Dealers in fertilisers, artificial manures, etc. Nominal capital, £2,000 in £1 shares (500 preference and 1,500 ordinary).

PEOVER AND FRIENDS, LTD., Castle Chambers, 3, Hounds Gate, Nottingham. Manufacturers of and dealers in plant and general equipment for chemical works, oil refineries, etc. Nominal capital, £1,000 in £1 shares.

P. STAPLETON, LTD., Mountsorrel Dye Works, Mountsorrel, Leicester. Dyers. Nominal capital, £5,000 in £1 shares.

Russia's Naphtha Export Trade

THE *European Commercial* states that, according to official figures published in the *Ost-Express*, the Russian export of naphtha products in 1922 amounted to 11,455,000 puds, including, among others, 4,815,000 puds of petroleum, 2,875,000 puds of benzine, 3,099,000 puds of lubricating oil and 588,000 puds of fuel naphtha. An amount equivalent to 55·7 per cent. went to England, 23·8 per cent. to Germany, 8 per cent. to Persia, 6 per cent. to France, 4 per cent. to Turkey, 2 per cent. to Hungary, and the remaining 0·5 per cent. was divided between Belgium and Latvia. Reckoned in values, the total exports of this commodity amounted to 15 million gold roubles. The naphtha export trade is to be reorganised, and will be effected exclusively through the medium of the State Naphtha Syndicate, which will have its chief headquarters in Berlin and Constantinople, will be represented in 13 West European towns, and will have stores in Bulgaria, Egypt, Persia and Turkey. Orders have already been given—4,000,000 gold roubles is said to be the figure—in England and Germany for the necessary plant, and negotiations are being conducted with a group of English, German and Dutch firms for a large credit for similar purchases in these countries.

Electrical Heating Tables

HENRY WIGGIN AND CO., LTD., of Birmingham, have issued a very useful book of tables relating to their special "Snake Brand" alloys which are manufactured for electrical heating purposes. The tables refer to a variety of alloys of nickel, chromium, iron, copper, etc., designed for use as resistance wires and strips at different temperatures, ranging from 1,100°C. downwards. The tables cover sizes, wire-gauges, resistances, current capacities, etc., of the various alloys, which sell under the names Brightray, Glowray, Redray, Dullray, Ferry, and so on. It may be noted that all the products are British made and replace alloys of American origin which had been previously used for heating purposes. The booklet will be supplied free of charge by those sending their trade or professional card either direct to the works or to the firm's London agents, Lionel Robinson and Co., 3, Staple Inn, Holborn, W.C.1.